RECORDS

of the

GENETICS SOCIETY OF AMERICA

NUMBER TWENTY-THREE

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DIRECTIONS FOR THE GAINESVILLE MEETINGS

All society sessions will be held on the campus of the University of Florida. AIBS registration will be in the Main Lobby of Broward Hall, Inner Drive. If you have made your room reservation in advance, the form which was sent to you should be presented at the registration desk.

The AIBS Bulletin for April includes among its recommendations the suggestion that sport clothes be worn except for banquets and similar functions. Meals will be served in several University cafeterias from September 5 to 10. It is estimated that the meals will cost approximately $2.25 per day per person.

University officials plan to have a fleet of buses and cars available to meet all planes, trains and buses arriving in Gainesville and Waldo on Sunday, September 5.

OFFICERS CONSTITUTING EXECUTIVE COMMITTEE

President . . . . . J. T. Patterson
Vice President . . . . . R. A. Brink
Secretary . . . . . C. P. Oliver
Treasurer . . . . . N. H. Giles
Past President . . . (Term expires Dec. 31, 1954) . . . . . J. W. Gowen
Past President . . . (Term expires Dec. 31, 1955) . . . . R. E. Clausen

Committee on Aid to Geneticists Abroad

R. E. Cleland (Chairman) R. C. Cook H. B. Glass H. J. Muller

Nominating Committee

Warren Spencer (Chairman) L. R. Dice M. M. Rhoades

Program Committee

R. P. Wagner (Chairman) W. E. Briles Meta S. Brown W. S. Stone

Public Education and Scientific Freedom Committee

R. E. Cleland (3 years) C. Stern (2 years) M. R. Irwin (1 year)
President and Secretary of the Society

Sustaining Membership Committee

Bruce Wallace (Chairman) H. E. Brewbaker V. Bryson O. J. Eigsti
E. E. Schnetzler E. W. Wentworth F. L. Winter

REPRESENTATIVES OF THE SOCIETY

The Council of the American Association for the Advancement of Science
Section F.—M. R. Irwin . . . . . (to Dec. 31, 1955)
Section G.—Karl Sax (to Dec. 31, 1954)

Division of Biology and Agriculture of the National Research Council
Jay L. Lush . . . . . (to June 30, 1955)

Board of Directors of the American Institute of Biological Science
Carl P. Swanson . . . . . (to June 30, 1958)

Editorial Committee of the American Journal of Botany
E. R. Sears . . . . . (to Dec. 31, 1955)

Editorial Committee of Genetics
Tracy M. Sonneborn . . . . . (to Dec. 31, 1956)

Local Respresentatives for the Gainesville Meetings
Fred H. Hull (Chairman) J. C. Dickinson M. Koger

PAST AND PRESENT OFFICERS OF [redacted] SOCIETY

	President	Vice-President	Secretary-Treasurer
1932	L. C. Dunn	F. D. Richey	P. W. Whiting
1933	R. A. Emerson	Sewall Wright	P. W. Whiting
1934	Sewall Wright	D. F. Jones	P. W. Whiting
1935	D. F. Jones	P. W. Whiting	M. Demerec
1936	P. W. Whiting	L. J. Stadler	M. Demerec
1937	E. M. East	L. J. Cole	M. Demerec
1938	L. J. Stadler	M. Demerec	E. W. Lindstrom
1939	M. Demerec	B. McClintock	E. W. Lindstrom
1940	L. J. Cole	Th. Dobzhansky	E. W. Lindstrom
1941	Th. Dobzhansky	E. W. Lindstrom	B. P. Kaufmann
1942	E. W. Lindstrom	M. M. Rhoades	B. P. Kaufmann
1943	M. M. Rhoades	G. W. Beadle	B. P. Kaufmann
1944	A. H. Sturtevant	B. P. Kaufmann	L. H. Snyder
1945	B. McClintock	P. C. Mangelsdorf	L. H. Snyder
1946	G. W. Beadle	Karl Sax	L. H. Snyder
1947	H. J. Muller	L. H. Snyder	M. R. Irwin
1948	L. H. Snyder	T. M. Sonneborn	M. R. Irwin
1949	T. M. Sonneborn	Curt Stern	M. R. Irwin
1950	Curt Stern	M. R. Irwin	W. R. Singleton

		Secretary	Treasurer
1951	M. R. Irwin	J. W. Gowen	W. R. Singleton	Ernst Caspari
1952	J. W. Gowen	R. E. Clausen	W. R. Singleton	Ernst Caspari
1953	R. E. Clausen	W. R. Singleton	C. P. Oliver	Ernst Caspari
1954	J. T. Patterson	R. A. Brink	C. P. Oliver	N. H. Giles, Jr.

CONSTITUTION AND BY-LAWS

(As amended at the annual meeting, Boston, Mass., December 29, 1953)

CONSTITUTION

The Genetics Society of America is organized to provide facilities for association and conference among students of heredity and for encouragement of close relationship between workers in genetics and those in the related sciences.

Article 1. Membership. — All persons actively interested in any field of genetics shall be eligible to active membership. Any person who has been an active member of the Society continuously for 20 years, and who has retired, is eligible to emeritus membership. All organizations interested in any field of genetics shall be eligible to sustaining membership. Each sustaining member shall have the privilege of being represented at any meeting of the society by one delegate appointed by the sustaining member. This delegate shall be eligible to hold office only if he is an active member. Candidates for all classes of membership shall be recommended by two members of the Society. All members shall be elected by the Executive Committee.

Article 2. Officers. — The officers of the Society shall be a President, Vice-President, a Secretary, and a Treasurer. The President and the Vice-President shall serve for one year; the Secretary and the Treasurer shall serve for three years. These officers together with the two most recent past Presidents of the Society shall constitute the Executive Committee.

Election of Officers. Two condidates for each office shall be nominated by the nominating committee who will take into consideration suggestions made to the Secretary by members of the Society. Such names will be transmitted by the Secretary to the Nominating Committee. A ballot bearing the names of the nominees, without distinction as to mode of nomination, shall be mailed to each member at least two weeks before the annual meeting. The officers elected shall take office on the following first of January after their election. If an election should be held after January 1 of a meeting begun at the end of the previous year, the officers shall take office immediately. Terms of past president members of the Executive Committee shall expire on December 31.

Article 3. Meetings. — The time and place of the annual meeting shall be determined by the Executive Committee, with due regard to the plans of allied societies. Special meetings may be called by the President, with the approval of the Executive Committee.

The program shall be arranged by the Secretary in accordance with the program rules adopted by the Executive Committee. The Executive Committee may arrange for joint programs with related scientific societies, and for the presentation of invitation papers.

Article 4. Amendments. — Amendments to the constitution may be adopted at the annual meeting by a two-thirds vote of the members present and voting, provided that the proposed amendment, signed by five members, has been submitted in writing to the Secretary at least three months before the annual meeting, and has been communicated to the members of the Society at least two weeks before the annual meeting. By-Laws may be amended at the annual meeting by a majority vote of members present.

BY-LAWS

Dues. — The annual dues for active members, except those of emeritus standing and graduate students, shall be $4.00 ($2.50 to the Society, $1.00 to A.I.B.S. and $.50 for Biological Abstracts) and for sustaining membership $50.00. The reduced dues for graduate students shall apply for a maximum of three years. No dues shall be charged to emeritus members. The dues for graduate students shall be $2.50 for a maximum period of three years. Payment shall be due January 1. Members in arrears shall receive no publication of the Society. Any member in arrears for two years shall be dropped from the rolls, but shall be eligible for re-election to membership.

Publications. — The Society shall publish programs of the scientific meetings and abstracts of the papers to be presented. Copies of these publications of the Society shall be furnished without charge to members in good standing.

Duties of Officers. — The President shall preside at the meetings of the Society. He shall appoint the nominating committee, auditing committee, and such other committees and representatives as may be needed. The Vice-President shall preside in the absence of the President. In the event of a vacancy in the office of President, the Vice-President shall become President and shall appoint another member Vice-President. In the event of a vacancy in the office of Vice-President, Secretary or Treasurer, the President shall appoint an active member to serve for the remainder of the year, and the office shall be filled by election at the next annual meeting.

The Secretary shall keep the records of the Society. He shall arrange the programs in accordance with the program rules formulated by the executive committee. At least two months before the annual meeting, he shall send to members (1) a call for papers to be presented at the annual meeting, and (2) a call for nominations for all offices to be filled by election at the meeting. At least two weeks before the annual meeting he shall send to members (1) a program and abstracts of papers to be presented at the meeting, (2) a ballot bearing the names of nominees for all offices to be filled by election at the meeting, and (3) a copy of any amendments to the constitution to be voted on at the meeting. The Secretary is authorized to

employ clerical assistance when necessary, to make such purchases as will, in his judgment, expedite the business of the Society. The expenses of the Secretary to the annual meeting shall be provided to the extent not covered by the institution in which he works.

The Treasurer shall have charge of all funds of the Society. He shall send to members bills for annual dues. At least two months before the annual meeting he shall send to members in arrears a bill for dues. At the annual business meeting of the Society he shall present a statement to date of the funds of the Society. He shall be authorized to employ clerical assistance when necessary, and to make such purchases as will, in his judgment, expedite the business of the Society.

Committees. — The Executive Committee is authorized to transact all business for the Society between meetings, to formulate and modify program rules, and to elect new members.

The nominating committee shall consist of three members appointed by the President at least six months before the annual meeting. At least two months before the annual meeting the nominating committee shall send to the Secretary two nominations for each office to be filled by election at the annual meeting.

The auditing committee of two members shall be appointed by the President previous to the annual business meeting. This committee shall audit the financial record and statement of the Treasurer and shall report at this meeting.

PROCEEDINGS OF 22ND ANNUAL MEETING
BOSTON, MASSACHUSETTS
DECEMBER 28-30, 1953

The Genetics Society of America met with the American Association for the Advancement of Science in Boston, Massachusetts, December 28-30, 1953. The meetings were held at Hotel Sheraton Plaza on December 28 and 30 and at Harvard University on the 29th.

There were 5 sessions of 72 short papers, a morning session of 6 invitation papers, an afternoon session of 12 demonstration papers, and 20 papers read by title. The Society also co-sponsored one symposium with the American Society of Naturalists, and another with the American Society of Human Genetics and the American Society for the Study of Evolution.

Minutes of the Business Meeting

The annual luncheon and business meeting of the Society was held at Hotel Continental in Cambridge on Tuesday, December 29. A total of 155 attended the luncheon.

President Roy E. Clausen called the business meeting to order. The Secretary explained that the Records for 1953 had been delayed in printing, and that the minutes of the 21st annual meeting are included in the 1953 Records. Dr. E. Caspari, the Treasurer, gave the Treasurer's 1952 report (audited by B. Wallace and V. Bryson) and the interim report for 1953. The reports are included in the 1953 Records.

The President called for a report of the tellers, Dr. W. K. Baker and Dr. D. Schwartz. Dr. Baker reported that 589 ballots had been received, and that the following officers were elected: J. T. Patterson, President; R. A. Brink, Vice-President; N. H. Giles, Jr., Treasurer for 3 years; R. E. Cleland, Member of the Public Education and Scientific Freedom Committee for 3 years.

The Secretary reported for the Executive Committee which had held its annual business meeting on December 27 in Hotel Sheraton Plaza. The following officers were present at the meeting: Clausen, Caspari, Irwin, Gowen and Oliver. Dr. Wallace Boyes of McGill University was invited to take part in the discussions about the Tenth International Genetics Congress.

The Executive Committee recommended that enough copies of the 1954 abstracts be purchased for publishing in GENETICS. The motion was approved.

Two grants made by the Executive Committee were reported by the Treasurer. 1. To GENETICS: Recognizing the financial burden of GE-

NETICS, the important service the journal performs for members of the Society, and the need for extra pages in the journal in order that publications be not delayed, the Executive Committee voted to make a grant of $500.00 to GENETICS toward publication costs. The money is to be taken from the Sustaining Membership Account which is part of the Special Fund set up for special purposes to be used at the discretion of the Executive Committee. 2. To Local Committee, Tenth Congress: In order to help with the initial expenses in organizing the Tenth International Congress of Genetics, the Executive Committee made a grant of $300.00 to the Local Committee at McGill University. The money is to be taken from the Royalty Fund which is part of the Special Fund.

A committee on liaison to coordinate the work of GENETICS and of the Society, requested at the Business Meeting in 1952, has been established. The committee members are the Society Representative on the Editorial Board (Dr. Sonneborn), Dr. Brink, and the Secretary of the Society.

Committee Reports

Committee on Aid to Geneticists Abroad: R. E. Cleland, Chairman, reported that the Committee had not been active during the year. The Committee recommended that it be retained on an inactive basis in order to be available for emergency situations, and that it be given authority to use its funds to send food parcels where that seems feasible and desirable. A motion to approve the request was adopted.

Public Education and Scientific Freedom: Curt Stern, Chairman, reported that a resolution to be presented by a member of the Society had been considered; the resolution was not yet in final form. The Committee has been looking for someone to write a pamphlet which will give information about opportunities in the science of genetics and about the qualifications required of workers in the field; a member of the Society has agreed to prepare the booklet.

Travel Committee for the IX International Congress of Genetics: (Members: R. C. Cook, K. W. Cooper, O. J. Eigsti, M. T. Jenkins, F. J. Ryan (chairman), B. Wallace.)

"The Travel Committee was constituted by ex-President Gowen and charged with facilitating the travel of members of the Genetics Society of America to the IX International Congress of Genetics at Bellagio, Italy, August 24-31, 1953.

"It considered its task to be two-fold.

"1. To help members make their travel reservations through the distribution of information and the selection of, and cooperation with, an official Travel Agency.

"2. To attempt to raise funds to help finance the travel of members.

"The first objective was met by notifying the membership of our activities through the general distribution of a bulletin and a questionnaire and through notices in the program of the 21st Annual Meeting of the G. S. A. at

Ithaca, the Bulletin of the AIBS, and the journal Genetics. Those members who expressed interest were sent two additional bulletins of information. Furthermore, the Clara Laughlin Travel Services, Inc. was selected and it efficiently arranged for the transportation of more than 80 members.

"With regard to raising funds the Committee had the generous assistance of the Executive Committee of the G. S. A. and of several members at large. We would especially like to thank Drs. Demerec, Glass, Lush, Singleton, Sonneborn and Srb whose cooperation greatly eased our burden. In all more than 200 separate contacts were made with individuals, private and governmental agencies and with companies whose commercial activities were thought to have brought them in contact with genetics. Fourteen favorable responses were received, an efficiency of slightly less than 7 per cent. These generous organizations and the sums donated were as follows:

American Cancer Society	$2,500.
Carworth Farms, Inc.	100.
Damon Runyon Memorial Fund	1,000.
DeKalb Agricultural Association	500.
Dover Publications	5.
Ferry Morse Seed Co.	300.
W. H. Freeman and Co.	50.
Kimber Farms, Inc.	50.
Eli Lilly and Co.	1,000.
National Science Foundation	5,000.
New American Library, Inc.	25.
Nichols Poultry Farm, Inc.	300.
Rapkine French Scientist Fund	300.
	$11,130

"The Ferry Morse Seed Company made its donation for a young plant breeder and the Rapkine French Scientist Fund asked that its gift be used for a biochemical geneticist. All of these sums were either deposited with the Treasurer and then disbursed by the Screening Committee, of which Dr. Singleton was chairman, or, as was the case with the National Science Foundation, were awarded directly by that Foundation with the advice of the Screening Committee. In addition, the DeKalb Agricultural Association and the Associated Seed Growers, Inc. made gifts of $1,000 and $1,100 directly to geneticists of their own choosing. Thus, in all $13,230 was raised for travel grants.

"The total attendance at the Congress was 886 persons of whom 203 were North Americans. Certainly a very large fraction of the latter availed themselves of the services of this Committee and 41 received travel grants from funds it raised."

Respectfully submitted,

Francis J. Ryan, Chairman

Committee to Screen and Evaluate Applicants for Financial Aid to Attend IX International Genetics Congress, in Bellagio, Italy, August 24-31, 1953:

"The Committee appointed to screen and evaluate applicants for financial aid to attend the IX International Genetics Congress considered a list of 112 applicants. Since the Committee was large (8 members) and widely distributed geographically, the deliberations of the committee were carried on by correspondence.

"A subcommittee consisting of Barbara McClintock, Francis Ryan and the chairman was appointed to determine the operational procedure for the committee, to summarize the replies of the other committee members and make selections based on these replies. The subcommittee met 3 times in New York. We submitted a list of names to the National Science Foundation. From this list they made 15 awards of $300. each and 1 award of $500. to Dr. R. B. Goldschmidt, President of the Congress, for a total of $5000. (One grant of $300. was declined too late to secure a replacement.)

"The committee also chose 21 persons to receive awards of $300. each from other funds. The committee members considered several factors in making the ratings. These were intended to accomplish representation according to age groups, geographic distribution, fields of genetics, institutions, officials of the congress, and when known, particular financial burdens of some of the applicants. (In addition one award was made from Sustaining Membership funds by the Executive Committee of the Genetics Society.)

"The appended list gives the names of all persons who received grants, also those who declined grants for various reasons. In all, grants were offered to a total of 50 persons slightly less than half of the total list of 112 applicants.

Respectfully submitted,

R. A. Brink
Herman B. Chase
Edward B. Lewis
Francis Ryan
Arthur B. Chapman
Charles W. Cotterman
Barbara McClintock
W. Ralph Singleton, Chairman

List of Persons Who Received Grants to Attend
IX International Genetics Congress, Bellagio, Italy, August 24-31, 1953.

National Science Foundation Grants

1. Richard Goldschmidt
2. Hampton L. Carson
3. Ernst Caspari
4. Ruth V. Dippell
5. Allen S. Fox
6. Joseph C. Gall
7. Eldon Gardner
8. Melvin Green
9. R. P. Levine

Other Funds

1. Vernon Bryson
2. W. J. Burdette
3. C. R. Burnham
4. J. W. Cameron
5. Herman Chase
6. Norman Giles
7. H. B. Glass
8. Aloah Hannah
9. William Hovanitz

10. C. P. Oliver
11. A. H. Sparrow
12. Kathryn F. Stein
13. Bruce Wallace
14. Meta Brown
15. Mildred Swann

Sustaining Membership Fund

1. F. J. Ryan
10. Walter Landauer
11. Harlan Lewis
12. J. L. Lush
13. Helen U. Meyer
14. Herschel Mitchell
15. Mary Mitchell
16. George Snell
17. Tracy Sonneborn
18. Clyde Stormont
19. Herluf Strandskov
20. I. Juan Valencia
21. Henry Vogel

Grants Declined

National Science Foundation Funds

1. David Bonner
2. Myron Gordon
3. R. C. King
4. J. Lederberg
5. Drew Schwartz
6. Maurice Whittinghill

Other Funds

1. Richard Caldecott
2. Arthur Chapman
3. George Rudkin
4. E. R. Sears
5. Arthur Steinberg
6. Curt Stern
7. Wilson Stone

New Business

A request by the "Travel Committee for the IX International Congress of Genetics" that it be discharged was presented to the Society. A motion to approve the request and to express appreciation for the work of the Committee was carried by acclamation.

The "Committee to Screen and Evaluate Applicants for Financial Aid to Attend IX International Genetics Congress" requested that it be discharged. A motion expressing appreciation for the work of the Committee and accepting the request was carried by acclamation.

A resolution from the American Society of Human Genetics was presented. It reads: Resolved that, "The subject of human genetics has enjoyed a remarkable growth which should afford it an official representative from the American Society of Human Genetics on the General Committee having to do with organizing the International Congress of Genetics to be held in 1958." A motion that the Executive Committee take such action as seems justified was approved.

A request was submitted, for Mrs. Hugo Iltis, that the Society take an active part in preserving the Gregor Mendel Museum of Genetics which is now located at Mary Washington College. In the discussion, Dr. Rife said that Ohio State University is interested in securing the Museum if conditions can be met. A motion was made that the President be empowered to appoint a committee of three to study the proposal by Mrs. Iltis and to seek means for preserving the Museum. The motion carried.

The Executive Committee recommended that the 1955 meeting of the Society be held with the AIBS at East Lansing, Michigan. A motion to accept the recommendation was approved.

The Executive Committee requested that the Society authorize the committee to cooperate with McGill University in setting up necessary organizing committees for the Tenth Congress. A motion to that effect was approved.

Dr. Wallace Boyes made a motion thanking the local committee, Drs. R. C. Rollins and S. S. Pauley, and the other local members for the arrangements which had been a contributing factor to the success of the meetings. The motion was carried by acclamation.

Meeting adjourned at 2:45 p.m.

C. P. Oliver

Secretary

REPORT OF THE SECRETARY

(C. P. Oliver)

The short interval of time between an annual meeting held in December and one held the following September causes complications. Newly appointed committees have little time to accomplish their tasks and prepare their reports for the annual meeting. The Program Committee begins to wonder whether the members of the Society are going to send in their abstracts for the sectional meetings. Members are justified in their belief that the deadline for receiving abstracts comes very early in the year. This condition is necessary because the Parent Organization has its own deadline for receiving the Society program. Also our Records are due to be mailed to members on a specified date preceding the annual meetings. The narrow margin of time makes it imperative that the abstracts be sent to the printer on time for him to complete his work.

At the Boston meeting, President Clausen was authorized to appoint a Mendel Museum Committee. This committee was authorized to examine the Mendel Museum at Mary Washington College, with Mrs. Anna Iltis as director, and to explore the possibility of finding a permanent home for the exhibits closely associated with the life of Mendel. The Committee, composed of R. C. Cook (chairman), W. R. Singleton, and the Secretary of the Society, has been active.

The Society at the Boston meeting authorized the Executive Committee to work in cooperation with McGill University in organizing the Tenth International Congress of Genetics. A committee of six members of the Genetics Society was appointed by President Clausen to act as the General Organizing Committee for the Congress. Chairman is Dr. J. W. Boyes who is also the Congress Local Chairman. Dr. S. G. Smith and Dr. Norma Ford Walker from Canada are members. Dr. Walker was nominated by the American Society of Human Genetics to represent them on the organizing committee. The other three members on the General Organizing Committee are Dr. M. Demerec, Dr. Paul C. Mangelsdorf and Dr. F. J. Ryan. The Secretary of the Society is an ex-officio member. Reports will be made by the Congress Committee to the Genetics Society.

The following changes in membership have occurred since the 1953 report. Four have become emeritus members. Two have died. Thirty-four have resigned, or have been dropped because of dues in arrears for two years or because forwarding addresses are unknown. Thirty-two new members have completed their application cards and have been approved or are in the process of being approved for membership. In addition seven have been recommended for membership but have not, by May 15, returned application forms. The present membership includes ten sustaining, 35 emeritus, and 934 other approved members.

Biographical sketches of R. J. Kamenoff and M. E. Power whose deaths have been reported during the past year have been received, as have sketches for two of the deceased members who were referred to in the preceding report.

ALFRED E. CLARKE

1903-1952

Dr. Alfred E. Clarke, Geneticist, United States Department of Agriculture, died in his sleep on November 12, 1952, while on vacation with his parents in Vancouver, British Columbia.

Dr. Clarke joined the Bureau of Plant Industry, Soils, and Agricultural Engineering in June 1936, and since about 1942 was closely associated with the onion-breeding program. He took his undergraduate work at the University of Alberta, Edmonton, Canada. Graduate work was pursued at the University of Wisconsin from 1929 to 1931, where he obtained his doctorate. The years 1931 to 1936 were spent in California, either at the University of California, Berkeley, or at the California Institute of Technology, Pasadena.

Dr. Clarke was located at the Plant Industry Station, Beltsville, Md., from June 1936 through February 1948. He was stationed at Logan, Utah, from March 1948 through February 1952, when he was transferred to the Branch Experiment Station, Parma, Idaho. At Parma he cooperated in the rather extensive hybrid onion program.

Dr. Clarke was co-author of the paper "Inheritance of Male Sterility in the Onion and the Production of Hybrid Seed," which won the Vaughan award in 1943. He was an outstanding geneticist. He had a keen analytical mind and was an indefatigable worker. We shall miss him greatly in our breeding program and as a friend and advisor. — Henry A. Jones

FREDERIC GROSVENOR CARNOCHAN

1890-1952

Frederic G. Carnochan was a man with fine human qualities and a keen interest in the natural sciences. Fred was in the truest sense of the word a gentleman. He never knowlingly hurt anyone's feelings, which does not mean to say that he always agreed with everyone. It was characteristic of the man never to try to win an argument by making his opponent feel ignorant or inferior. Whatever the outcome of a discussion, Fred had the happy faculty of making you feel that he respected your views, and you as an individual.

Fred's education did not cease with his post-graduate courses at the old Bussey Institute and the Sorbonne. He was a student all his life and his interests were catholic to the extreme. His thirst for knowledge included

all the natural sciences, particularly genetics, botany, psychiatric research and ethnology. His research activities were not limited to genetic and immunologic experiments at Carworth Farms; they extended to horticulture, ichthyology and dog breeding. He served as a member of the Board of Visitors at Rockland State hospital and Summit Park Sanitorium. He was active in civic affairs which he approached in the same scholarly manner as he did any subject which roused his interest. He was an inveterate reader and his remarkable memory stood him in good stead in pursuance of his different activities.

During his first year with Carworth Farms, Fred wrote his second book about his explorations in Africa, "The Empire of the Snakes." He spent many years on that continent collecting ethnological data and studying the flora and fauna. It was typical that one of his fondest memories of this part of his life was his association with Kalola, the old witch doctor. There were two men that he looked up to above all others for their deep wisdom and knowledge; one was Kalola and the other was his professor of genetics and adviser, W. E. Castle. Kalola in turn evidently admired Fred as he was instrumental in arranging for his initiation into the secret society of the tribe, the only white man ever to be accorded this great honor.

The accomplishment for which I am most grateful to Fred is his help and counsel in shaping the course which our business has followed religiously since its inception. His training in the field of genetics made him realize the necessity for the use of pure strains of animals in medical research. He felt that enough emphasis was not placed on the kind of animal used and that most investigators in the 30's considered all "white" mice to be equally satisfactory for the investigation of infectious diseases. Even after the work of Sawyer et al. with yellow fever, and of Webster with St. Louis encephalitis, there was no general stampede to the use of genetically pure stocks. However, with Fred's enthusiasm and unbounded confidence in the eventual recognition of the importance of hereditary characteristics in the research animal, he worked hard at producing strains that he hoped would prove of value. During one period there were nine inbred families of guinea pigs and three of rabbits, as well as numerous mouse strains continually being tested for use for specific purposes. Unfortunately with regard to the guinea pigs and the rabbits there was no spectacular susceptibility discovered which could justify their cost for most laboratory investigations. However, individuals from some of the families of both species were given away to research laboratories where they are being carried on and some day may prove to be of scientific value. Since the mouse demonstrated most marked differences in susceptibility to infectious diseases, Fred then concentrated on producing the most useful of our strains in order to make them generally available. He has not only set up a reliable system of testmating but continued to search for new mutations which might be of genetic interest. Thus, his love for acquiring knowledge which extended through his whole life ended only with his death.

Frederic G. Carnochan died August 3, 1952. — C. N. Wentworth Cumming

RALPH JOHN KAMENOFF

1902-1953

The life of Ralph Kamenoff was marked by three divisions: a brief research phase, a period of teaching, and an interval of service to students through administrative counseling and guidance. Kamenoff died of a heart attack on July 22, 1953.

In his role as a productive research worker, Kamenoff was profoundly influenced by Professor L. C. Dunn and Dr. E. C. MacDowell. Under their guidance, he studied the embryological development of flexed-tail in the mouse. In the course of these studies opportunities arose to work at Cold Spring Harbor, where he held the John D. Jones Scholarship of the Wawepex Society in the summers of 1932 and 1933. His work on the effects of the flexed-tail mutation remains a model of careful study, contributing to a prevailing thesis in embryology that growth retardation of tissues at critical periods of development may result in severe anatomical disturbances not always clearly connected with the primary event. The associated anemia present in flexed-tail embryos directed Kamenoff to an interest in the comparative haematology of mice, and was the subject of later investigations performed in the laboratory of Dr. MacDowell.

Following the completion of this research, Kamenoff returned to the College of the City of New York, where he had received his A.B. in 1923 and had been teaching intermittently. Aside from an interval from 1924 to 1928 spent as a New York City high school teacher, Kamenoff's academic activities were devoted entirely to the service of his Alma Mater, interrupted only to earn an M.A. (1926) and Ph.D. (1934) at Columbia. His duties became increasingly administrative as he advanced to an associate professorship and assumed the position of Assistant Dean in Charge of Guidance in the School of Business (1946).

Ralph Kamenoff was not only untiring in the service of his students, but contributed greatly to the civic life of the community of Huntington where he lived with his wife Mary Vedder Kamenoff and Louisa, his 12 year old daughter. — V. Bryson

MAXWELL E. POWER

1913-1954

Maxwell Elliott Power was born October 2, 1913 on the family farm in Hamilton County, Indiana, the son of Alvin S. and Harriet Elliott Power. After attending the public schools at Thorntown and Lebanon, Indiana, he graduated from Indiana University in 1936. He continued his interest in biology at the University of Oklahoma where he received the M.S. degree in 1938. At this time he accepted a graduate assistantship in zoology at Yale University where his outstanding study of the brain of Drosophila became his thesis for the Ph.D. degree which he received in 1942. He remained at

Yale as an instructor until 1946. He became assistant professor of biology at Kenyon College, Gambier, Ohio in August, 1946 and was successively promoted to an associate professorship in 1950 and to a full professorship in 1953.

Professor Power's death is a great loss to both scholarship and education. His brilliant series of studies of the nervous system of Drosophila provide an enduring monument to a tragically short scientific career. His students and colleagues will remember him as a remarkable teacher whose breadth of view and insistence on high standards and scientific precision stimulated unusual interest in his courses. His many friends will remember his great personal charm which arose partly from his wide cultural interests—from stained glass to Haydn's quartets—partly from his dry, penetrating wit, but in good measure from his warm and helpful interest in their efforts.

Dr. Power was killed instantly in a truck-auto collision near Baghdad, Iraq, on March 5, 1954. He had been teaching at Queen Aliyah College, Baghdad, on a Fulbright Lectureship which he held for 1953-54. Dr. Power is survived by his parents and two brothers. — C. S. Thornton

GENETICS SOCIETY OF AMERICA

1953 Treasurer's Report (Ernst Caspari)

Regular Membership Account

	Receipts	Expenditures
Balance 1/1/53	$1,151.85	
1953 membership dues	3,037.65	
Back dues (1952 and earlier	111.50	
1954 dues	25.00	
Sale of Records	14.00	
Interest	68.86	
Total	$4,408.86	
Records for Genetics		$ 330.74
AIBS contribution		699.00
Biological Abstracts (902 members)		451.00
Mailing (stamps, addressing etc.)		255.26
Telephone and Telegraph		8.16
Supplies (incl. stationary)		64.30
Labor (incl. secretarial help)		125.29
Express and Freight		8.13
Bank charges		16.92
Secretary's trip to Meeting		202.64
Total		$2,161.44
Balance 12/31/53	$2,247.42	

Sustaining Membership Account

	Receipts	Expenditures
Balance 1/1/53	$1,212.81	
1953 membership dues (10 members)	500.00	
Royalties (Genetics in the 20th century)	435.75	
Total	$2,148.56	

	Receipts	Expenditures
Travel grant		$ 300.00
Freight for books		5.76
Total		$ 305.76
Balance 12/31/53	$1,842.80	

Account, Committee on Aid to Geneticists Abroad

	Receipts	Expenditures
Balance 1/1/53	$1,215.56	
Balance 12/31/53	1,215.56	

Travel Account for Congress in Bellagio

	Receipts	Expenditures
Grant, National Cancer Society	$2,500.00	
Gifts: Kimber Farms, Inc.	50.00	
De Kalb Hybrid Seed Company	500.00	
Ferry-Morse Seed Company	300.00	
Carworth Farms	100.00	
Chemical Trust Company	300.00	
Nichols Poultry Farm, Inc.	300.00	
Damon Runyon Memorial Fund	1,000.00	
Dover Publications, Inc.	5.00	
Eli Lilly and Co.	1,000.00	
W. H. Freeman and Co.	50.00	
New American Library	25.00	
Grant returned	350.00	
Total	$6,480.00	
Grants to 21 Geneticists		$6,430.00
Refund		50.00
Total		$6,480.00
Balance 12/31/53	0.00	

Total Balance 12/31/53	$5,305.78	
In checking Account, The Middletown National Bank	395.26	

	Receipts	Expenditures
In Savings Account, The Middletown Savings Bank	$3,712.16	
In Account, Committee on Aid to Geneticists Abroad	1,215.56	
Total cash on hand 12/31/53	5,322.98	
Checks outstanding 12/31/53		$ 17.20
Total Balance 12/31/53	5,305.78	
Checks to new treasurer 1/15/54		5,305.78
Balance 1/15/54	0.00	

May 7, 1954

Audited and found correct

Norman H. Giles
Donald F. Jones

NEW SUSTAINING MEMBERS

Kimber Farms Inc.
Niles, Calif. 1953

NEW EMERITUS MEMBERS

Hunt, Harrison R., Ph.D.
Dept. of Zoology
Michigan State College
East Lansing, Mich. 1922

Hutchison, Claude B., LL.D.
College of Agriculture
Univ. of Nevada
Reno, Nevada. 1922

Lyon, Harold L., Ph.D.
Experiment Station
Hawaiian Sugar Planter's Ass'n.
Honolulu, T. H. 1922

Roberts, Elmer, Ph.D.
College of Agriculture
University of Illinois
Urbana, Ill. 1922

EMERITUS MEMBERS, CHANGE OF ADDRESS

Coe, Wesley R., Ph.D.
183 Third Avenue
Chula Vista, Calif. 1926

NEW MEMBERS

Abrahamson, Seymour, B.A., Dept. Zoology, Indiana University, Bloomington, Ind. 1953

Ambellan, Elizabeth H., M.A., Dept. Zoology, Columbia University, New York 27, N. Y. 1954

Anderson, Virgil, Ph.D., Statistical Laboratory, Purdue Univ., Lafayette, Ind. 1954

Borstel, Robert C. von, Ph.D., Oak Ridge Natl. Lab., P. O. Box P, Oak Ridge, Tenn. 1954

Brown, Walter V., Ph.D., Dept. Botany, Univ. of Texas, Austin 12, Tex. 1954

Bryan, Clifford R., Ph.D., Dept. Zoology, Howard University, Washington 1, D. C. 1953

Buzzati-Traverso, Adriano A., Sc.D., Division Marine Genetics, Scripps Institute of Oceanography, La Jolla, Calif. 1954

Carver, G. L., M.A., Dept. Biology, Mercer University, Macon, Ga. 1954

Caśpar, Alan L., M.S., Dept. Biology, Brookhaven Natl. Lab., Upton, L. I., N. Y. 1953

Chester, William L., Johnson O'Connor Research Foundation, 11 East 62nd St., New York City, N. Y. 1953

Chouinard, Levi, Ph.D., Dept. Biology, Laval Univ., Quebec City, Quebec, Canada. 1953

Cohn, Norman Stanley, M.S., Osborn Botanical Lab., Yale University, New Haven, Conn. 1954

Cumming, C. N. W., Carworth Farms Inc., Rockland County, New City, N. Y. 1953

Davis, Johnny H., Ph.D., Dept. Cotton Improvement, Delta Branch Exp. Station, Stoneville, Miss. 1953

DeBusk, A. Gib, M. A., Dept. Zoology, Univ. Texas, Austin, Tex. 1954

Dickinson, J. C., Jr., Ph.D., Dept of Biology, Univ. of Florida, Gainesville, Fla. 1954

Erk, Frank C., Ph.D., Dept. Biology, Washington College, Chestertown, Md. 1954

Fuerst, Robert, M.A., Dept. Zoology, Univ. Texas, Austin, Tex. 1954

Fung, Sui-tong Chan, Ph.D., Genetics Dept., Iowa State College, Ames Iowa. 1953

Gartler, Stanley M., Ph.D., Dept. Medical Genetics, N.Y. State Psychiatric Inst., 722 W 168 St., New York 32, N. Y. 1953

Goodwin, Kenneth, Ph.D., Kimber Farms, Inc., P. O. Box 8, Niles, Calif, 1953

Gorz, Herman J., Ph.D., Dept. Agronomy, North Dakota Agr. College, Fargo, N. Dak. 1953

Guimaraes, Sr. Floriano F., M.S., Head Dept. Genetics, Estacao Experimental Horticultura, Rio Grande - Rio Grande do Sul, Brazil. 1953

Harris, Robert M., Ph.D., Dept. Botany & Range Ecology, Univ. of Arizona, Tucson, Ariz. 1953

Hexter, William M., Ph.D., Dept. Biol., Amherst College, Amherst, Mass. 1953

Hillman, Ralph, B.A., Dept. Zoology, Yale Univ., New Haven, Conn. 1953

Horner, Earl S., Ph.D., Agronomy Dept., Agr. Exp. Station, Univ. of Florida, Gainesville, Fla. 1954

House, Leland R., Dept. Botany and Plant Path., Purdue Univ., Lafayette, Ind. 1954

Howe, H. Branch, Jr., M.A., Dept. Genetics, Univ. Wisconsin, Madison 6, Wis. 1953

Koger, Marvin, Ph.D., Dept. Animal Husbandry, Univ. of Florida, Gainesville, Fla. 1954

Osborne, Richard H., B.S., Inst. for Study of Human Variation, Columbia Univ., New York 27, N. Y. 1953

Patterson, Fred L., Ph.D., Dept. Agronomy, Purdue Univ., Lafayette, Ind. 1954

Reed, T. Edward, Ph.D., Heredity Clinic, University of Michigan, Ann Arbor, Mich. 1954

Richardson, Dewayne Leroy, B.A., Dept. Botany, Univ. Illinois, Urbana, Ill. 1954

Rosenbloom, Esther R., B.S., Dept. Biology, Brookhaven Nat. Lab., Upton, L.I., N.Y. 1953

Ross, James G., Ph.D., Dept. Agronomy, South Dakota State College, College Station, S. Dak. 1953

Rossman, Elmer C., Ph.D., Dept. Farm Crops, Michigan State College, East Lansing, Mich. 1953

Runner, Meredith R., Ph.D., R. B. Jackson Memorial Lab., Bar Harbor, Maine. 1953

Schwartz, Edward L., Ph.D., 101 Genetics Bld., Univ. Wisconsin, Madison 6, Wisconsin. 1953

Siegel, Richard W., Ph.D., Dept. Zoology, Univ. Pennsylvania, Philadelphia 4, Pa. 1954

Sokal, Robert R., Ph.D., Dept. Entomology, Univ. Kansas, Lawrence, Kan. 1953

Stadler, Janice, M.S., Dept. of

Genetics, Iowa State College, Ames, Iowa. 1954
Stehr, Gotthard, Ph.D., Div. of Forest Biol., Dept. of Agric., Box 490, Sault Ste. Marie, Ontario, Canada. 1953
Stein, Otto L., M.S., Dept. of Botany, Univ. Minnesota, Minneapolis 14, Minn. 1954
Stinson, Harry Theodore, Ph.D., Dept. Genetics, Conn. Agr. Exp. Station, P. O. Box 1106, New Haven 4, Conn. 1954
Telfer, James D., M.S., Dept. Zoology, Indiana University, Bloomington, Ind. 1953
Vernon, Eugene H., Ph.D., Bureau Animal Industry, USDA, Iberia Livestock Exper. Farm, P. O. Box 466, Jeanerette, La. 1953
Wainwright, Stanley D., Ph.D., Biology Division, Atomic Energy of Canada, Ltd., Chalk River, Ontario, Canada. 1953
Wallace, Alvin T., Ph.D., Dept. of Agronomy, Fla. Agr. Exp. Station, Gainesville, Fla. 1954
Wood, Eunice M., M.A., Dept. Zoology, Columbia Univ., New York 27, N. Y. 1953
Yoon, Chai Hyun, Ph.D., Dept. Zoology Ohio State Univ., Columbus 10, Ohio. 1953

CHANGES OF ADDRESS

Barratt, Raymond W., Ph.D.
Dept. Botany,
Dartmouth College,
Hanover, N. H. 1950

Bowen, Charles Clark, M.S.
Dept. of Biology
Brookhaven National Laboratory
Upton, Long Island, N. Y. 1951

Brown, Meta Suche, Ph.D.
Dept. Agronomy,
Texas Agr. Exp. Sta.,
College Station, Tex. 1934

Bryan, John H. D., Ph.D.,
Dept. Genetics,
Iowa State College,
Ames, Iowa. 1953

Bull, Alice L., Ph.D.,
Dickinson House,
So. Hadley, Mass. 1952

Ching, Mrs. Te May Tsou, M.S.,
815 A Cherry Lane
East Lansing, Michigan. 1951

Colin, Edward C., Ph.D.,
Chicago Teachers College,
6567 Harvard Ave.
Chicago 21, Ill. 1933

Davis, Bernard D., M.D.,
Chairman, Dept. Pharmacology,
N. Y. Univ. Coll. Medicine,
New York 16, N. Y. 1950

Galinat, Walton Clarence, Ph.D.,
Botanical Museum,
Harvard Univ.,
Oxford Street,
Cambridge 38, Mass. 1950

Halperin, Sidney L., Ph.D.,
Box 825
Kaneohe, Hawaii. 1946

Hawthorne, Mary Elizabeth, Ph.D.,
Botany Dept.
Pennsylvania State Univ.
State College, Pennsylvania. 1951

Lein, Joseph, Ph.D.,
Department of Microbiology,
Bristol Laboratories Inc.,
Syracuse 1, N. Y. 1947

Maas, Werner K., Ph.D.,
Dept. Pharmacology,
N. Y. Univ. Coll. Medicine,
New York 16, N. Y. 1944

Martin, Albert, Jr., Ph.D.,
1155 Murrayhill Ave.,
Pittsburgh 17, Pa. 1947

Morgan, Walter C., Jr., Ph.D.,

Dept. Poultry Husbandry
University of Tennessee,
Knoxville, Tenn. 1950

Osborne, Thomas S., Ph.D.,
Agricultural Exper. Sta.,
Univ. of Tenn.,
Knoxville, Tenn. 1953

Papazian, Haig, Ph.D.,
Osborn Botanical Lab.,
Yale University,
167 Prospect St.,
New Haven, Conn. 1950

Peterson, Peter A., Ph.D.,
Dept. Horticulture
Univ. California,
Riverside, Calif. 1950

Pomper, Seymour, Ph.D.,
The Fleischmann Laboratories,
Betts Avenue,
Stamford, Conn. 1952

Raper, John R., Ph.D.,
Biological Laboratories,
Harvard Univ.,
Cambridge 38, Mass. 1952

Reid, David A., M.S.,
Cereal Crops and Diseases,
Plant Industry Station,
Beltsville, Md. 1936

Rizki, M. T. M., Ph.D.,
Osborn Zool. Lab.,
Yale Univ.
New Haven, Conn. 1950

Robbins, Edward W., Ph.D.,
1203 E. Columbia Ave.,
Philadelphia 25, Pa. 1950

Rubin, Benjamin A., Ph.D.,
1010 Intervale Ave.,
New York 59, N. Y. 1948

Schaeffer, Elizabeth, Ph.D.,
174 Elm St.,
Tenafly, New Jersey. 1940

Scheinfeld, Amram,
41 Fifth Ave.,
New York 3, N. Y. 1941

Schweitzer, Morton D., Ph.D.,
215 W. 94 St.,
New York 25, N. Y. 1933

Slatis, Herman M., Ph.D.,
Dept. of Genetics
McGill University
Montreal, Quebec
Canada. 1948

Smyth, Thomas, Jr., Ph.D.,
Dept. of Biology,
Tufts College,
Medford 55, Mass. 1950

Snyder, L. A., Ph.D.,
Dept. Agronomy and Plant Genetics
Univ. Minnesota,
St. Paul 1, Minn. 1952

Strong, Leonell C., Ph.D.,
Roswell Park Memorial Institute
Biological Station,
Springville, N. Y. 1924

Thompson, Ross C., Ph.D.,
Bureau of Plant Industry Sta.
Beltsville, Md. 1932

Valencia, Juan I., Ph.D.,
Lacar 3480,
Villa Devoto,
Buenas Aires,
Rep. Argentina. 1946

Warren, Herbert Stetson, Ph.D.,
610 Montgomery Ave.,
Bryn Mawr, Penn. 1932

Wentworth, Edward N., M.S.,
R. R. 1 Box 73,
Chesterton, Ind. 1922

Woodward, Val W., Ph.D.,
Brookhaven Nat'l Lab.
Upton, L. I., N. Y. 1952

Yanders, Armon F., Ph.D.,
Dept. Biological Sciences,
Cresap Laboratory,
Northwestern University,
Evanston, Ill. 1952

Ziska, George W., Jr., B.A.,
De Kalb Hybrid Seed Co.,
Box 451,
Illiopolis, Ill. 1950

ABSTRACTS OF PAPERS PRESENTED AT THE 1954 MEETINGS OF THE GENETICS SOCIETY OF AMERICA

GAINESVILLE, FLORIDA, SEPTEMBER, 6-8, 1953

ABRAHAM, S., I. H. HERSKOWITZ and H. J. MULLER, Indiana University, Bloomington, Ind. Genetic proof for half-translocations derived from irradiated oocytes of Drosophila melanogaster.* — Strong indirect evidence exists that X-ray-induced "detachments" of attached-X chromosomes in Drosophila oocytes containing no Y are usually due to rearrangements between the attached-X and an autosome. In such detachments, the attached-X is broken rather near its centromere, into a centric "J" and an acentric "I," and an autosome ("A") is broken subterminally (anywhere on 4 being subterminal). The stump of the J then becomes "capped" by the telomere-bearing autosomal tip, and/or the I becomes "captured" by attachment to the autosome's remainder in substitution for its tip. An egg receiving a capped J without I must, to survive, receive a complete maternal A, thereby becoming hyperploid for the autosomal tip, while one receiving a captured I without J is hypoploid for the tip. Either condition is genetically demonstrable if the tip includes a known marker. Capturing would also be recognizable by X-autosome linkage. — 39 detachment cases derived from oocytes irradiated O-4 days before oviposition have been tested for hyperploidy with regard to markers near the ends of the autosomal linkage maps. 19 have so far proved to be half-translocations involving one or more markers. One involved capping by the tip of 2L, including gene $a1^+$; two were cappings by 2R, both including $M22a^+$ and one sp^+ also; while 16 others were either cappings or capturings involving chromosome 4. This strong tendency toward X-4 translocations (compare independent finds of Lindsley and Novitski, D.I.S. 27) is most simply explained as resulting from the proximity of breakages (often heterochromatic) in appropriate positions in these chromosomes. (*Work supported by a grant from the U. S. Atomic Energy Commission (Contract AT(11-1)-195).)

ABRAHAMSON, S. and J. D. TELFER, Indiana University, Bloomington, Ind. Sex chromosome loss and translocation frequencies in Drosophila melanogaster after X-raying sperm in males or in females.* — Studies were undertaken of the effect of homogeneity, age, and stage of germ cells on X-ray mutagenesis. Sperm either in males (SM) or females (SF) were X-rayed and frequency of sex chromosome loss (partial or complete) and translocations determined by Muller's genetic stocks and procedures.

Females (Y^s .y InEN. Y^1; st), inseminated by 48-96 hr. old males (y In49 f B/sc^8 . Y; bw^D/bw^D) were given 600r and 3600r, respectively, while 48-60 hr. old sibling males were simultaneously given 3600r. One group of untreated females (SM1) was mated to treated males during first day after irradiation and another group (SM2) during second day. Losses involving either paternal sex chromosome were: control, 0.078 ± 0.039% (4/5080); 600r SF, 0.35 ± 0.05% (49-14,028); 3600r SF, 2.9 ± 0.71% (16/550); 3600r SM1 ± SM2, 1.52 ± 0.19% (19/1248). Translocation frequencies were: 600r SF, 1.43 ± 0.24% (40/2795); 3600r SF, 26.2 ± 2.78% (66/250); 3600r SM1, 11.0 ± 2.78% (13/118); 3600r SM2, 4.8 ± 1.26% (14/286). Both loss and translocation frequencies were lower from sperm treated in males than in females. (see similar results of Lüning in D.I.S. 27, which reached us after this work was under way). No difference was found for loss in first (1.42 ± 0.64%, 5/343) and second day (1.55 ± 0.41%, 14/905) inseminations, while the decline shown by the translocation frequency on second day is somewhat doubtful statistically. Mean losses of maternal X's, for eggs laid on first 12 days, were: control 0% (0/5330); 600r SF 0.236 ± 0.04% (35/14,876) and 3600r SF 2.28 ± 0.52% (18/787); later eggs of this period showed lower frequencies. Extent of participation of maternal chromosomes in the translocations is being investigated. (*Work has been supported by a grant to Dr. H. J. Muller and associates from the United States Atomic Energy Commission (Contract AT(11-1)-195).)

ALEXANDER, MARY L., FRANCES E. CLAYTON, and W. S. STONE, University of Texas, Austin, Texas. The induction of translocations by X-radiations at different stages of germ cell development in Drosophila virilis. — Induced translocations were used to demonstrate genetic damage to different stages of developing germ cells under several different physiological conditions. Males, 15 to 30 hours after eclosion, were X-radiated 2000 r in one minute at 0-5°C in a gas mixture with suitable pre- and post-treatment, mated individually to three marker females for 5 days; thereafter each male was remated every 48 hours for nine (A-I) mating periods. The first sperm used in inseminating females in lots A and B represent the advanced stages at irradiation; sperm used in subsequent matings were from earlier stages back to spermatogonia by H and I. In most tests the percent of translocation in B (7-9 days) corresponded to the values obtained for mature sperm treated under the same conditions. By D (11-13 days) or E (13-15 days) the frequency increased two or threefold. The values for air at the peak were 25 to 28% as compared to 17.2% for mature sperm from earlier experiments; in 96% N_2 + 4% O_2 the rate was 32% compared to 14%. In 95% CO + 5% O_2 there was a 39% peak at D and E, then an increase to 76% at F. After the peak, the rate drops to a value of 1% and less (spermatogonia). Early pupae produced a few offspring from meiotic or post meiotic stages with a translocation rate equivalent to that in the carbon monoxide mixture, then the rate fell to that of spermatogonia. (This work was supported by grants from the Rockefeller Foundation, and Atomic Energy Commission Contract AT-(40-1)-1323.)

ANNAN, MURVEL E., University of Nebraska, Linclon, Nebraska. Effects of X-rays on Drosophila robusta females. — Groups of ten virgin D. robusta females, 10 or 17 days old, were either exposed to X-rays (2,500 or 5,000 roentgen units) or served as untreated controls. Immediately after treatment each female was placed in a vial with two males. For 20 days after treatment, observations were made on fecundity and fertility. — The number of eggs laid was reduced by X-rays. Even though total egg production was reduced by 2,500 r, the reduction was less than 1/2 as great as in the 5,000 r treated series. — Dissection of the females on the 21st day showed the ovaries of those females which had been exposed to 5,000 r X-rays to be considerably atrophied. There were no detectable differences between the ovaries from females of different age groups treated alike or between the 2,500 r and control groups. — The reduction of egg-hatch by X-rays was nearly proportional to the dose for the first 10 days following treatment. From then on, variable recovery was exhibited. — A generally higher rate of X-ray induced dominant lethality was noted than that reported by Yanders (1954) in his study of D. robusta males. Whereas Yanders found a greater induction of dominant lethality in older flies compared to younger ones, there was no such effect of age when females served as the X-rayed parents.

ATWOOD, K. C., FRANK MUKAI, and THAD PITTENGER, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Neurospora techniques for large-scale studies of recessive lethal mutation. — The heterokaryon method for recessive lethals in Neurospora detects mutations leading to loss of essential functions anywhere in the genome. Special techniques have been developed for improving the speed and economy of the method, so that large-scale studies are no longer unduly laborious. These techniques involve a refinement of the sorbose plating method, rapid isolation of colonies from the plates by means of miniature open-ended culture tubes known as punch tubes, simultaneous sealing and supplying of additional medium to the punch tubes, and discharging the matured contents of each punch tube in proper dilution onto a portion of an agar plate. A Cornwall syringe and a special plate divider are used in this final step. Similar methods have been adapted to testing lethals of different origin for homology, hitherto almost prohibitively laborious. The steps in these procedures, use of the simple apparatus, and scoring of results will be demonstrated.

BAKER, WILLIAM K., Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Chromosome association and segregation in polysomic Drosophila males. — By use of a translocated chromosome bearing the centromere and peach locus of chromosome 5 and all the fertility factors of the Y chromosome (designated 5^{Y}), a genetic study has been made of segregation in D. virilis males of the following constitutions: $XY5^{Y}$, $X5^{Y}5^{Y}$, and $XY5^{Y}5^{Y}$. The mode of segregation was determined by a system of progeny testing in which the 5^{Y} chromosome could be followed since it produces variegated eyes when the mutant allele of peach is pres-

ent. – The segregation data obtained from the $XY5^Y$ could be interpreted similarily to Kikkawa's conclusion
males, i.e., a bivalent and a univalent are formed and the bivalent forms more frequently between the Y chromosomes. However, on this basis the segregation results found with $X5^Y5^Y$ males are inexplicable since bivalents would have to be formed between an X and a 5^Y to almost the complete exclusion of bivalents between the two identical 5^Y chromosomes. This raised the suspicion that the chromosome association determining segregation was not of the bivalent-univalent type but rather a multivalent association. – A cytological study has been made of first meiotic metaphases in males of the three genetic constitutions listed previously. The results of this study justify the suspicion raised since a trivalent is formed almost without exception in the $XY5^Y$ and $X5^Y5^Y$ males and a quadrivalent in the $XY5^Y5^Y$ males. Photomicrographs of these multivalent associations will be shown.

BEATTY, ALVIN V. and JEANNE W. BEATTY, Emory University, Ga. The influence of oxygen on the physiological effects of X-radiation in the microspores of Tradescantia paludosa. – Previous results from studies on the effect of oxygen on the frequency of X-ray-induced chromosomal rearrangements in the microspores of T. paludosa showed, when X-radiation was carried out at 50 r per minute for 8 minutes, an aberration frequency of 24% in helium, 43% in 5% oxygen and 78% in air. The same type of experiment was carried out for testing the physiological effects of X-radiation using as criteria the unspiraling and reversion of early and mid-prophase stages, the retardation of each stage of division and the clumping of chromosomes. The primary effects were found to be similar to the secondary effects in that they were greatest in air, least in helium and intermediate in 5% oxygen. The greatest amount of reversion in air was recorded at the fourth hour following X-radiation, in helium at the two hour period and in 5% oxygen between 2 and 3 hours. The other categories of measurement exhibited a proportional effect in a similar manner.

BELL, A. EARL, Purdue University, Lafayette, Indiana. A gene in Drosophila melanogaster that produces all male progeny. – A full sib mating within an inbred line of Drosophila melanogaster gave more than 500 sons and no daughters. Subsequent matings revealed the genetic nature of this sex ratio abnormality to be a recessive gene, second chromosome, locus about 43. The name "daughterless" (symbol da) is suggested as best describing the gene. Females homozygous, da/da, have 100 per cent male progeny regardless of the genotype of their mates. Males homozygous, da/da, have normal sex ratios in their progenies when mated with females other than da/da. – This abnormal sex ratio appears to be due to a lethal action in the egg stage against the females not appearing. While similar to the gene reported by Helen Redfield (Genetics 11: 482-502), "daughterless" is more severe in its action and does not appear to allelic. – The disguise of Sturtevant's "transformer" gene, which transforms females into males, was inadequate to escape the lethality of "daughterless." No XX tra/tra

individuals (females transformed into males) appeared among the 100 per cent male progeny from da/da females.

BLAIR, W. FRANK and DAVID PETTUS, University of Texas, Austin, Texas. Differentiation in mating call among southwestern anuran amphibians. — Differences in mating calls are important mechanisms of reproductive isolation in anuran amphibians, but until recently no objective method of comparing calls has been available. The calls of representative southwestern anurans have been analyzed with a "Sona-Graph," which gives a visual representation of the call in respect to time, frequency and intensity. A few basic patterns of calls have been so modified that the call of each species of anuran studied differs markedly from that of every other. Species within the same genus are distinguished by variations in at least one major attribute of the call. Variations in call occur within local populations; geographic variation in call occurs in widely distributed species. (This work supported under National Science Foundation Research Project NSF-G328.)

BLIGHT, WILLIAM C. (Introduced by H. L. Carson.), Washington University, St. Louis, Mo. A study of population structure in Drosophila americana near St. Louis, Mo. — Populations of this species appear to be limited to areas immediately adjacent to inland waters. The species is polymorphic for two alternative gene arrangements on each of three chromosome arms. These alternatives are designated Xab, Xabc; 4, 4ab; 5a and 5b. Population samples have been taken from various stations along the Meramec River in 1952 and 1953. Collections made in June, July and August are termed summer samples; those made in September, October and November are referred to as fall samples. — The fall '52 sample from the Highway 21 station showed a significant increase in the frequency of the 5b gene arrangement compared with summer '52. Fall '52 samples from Bauer Road, 3.3 miles upstream, and Eureka, 20 miles upstream, were also analyzed. Inversion frequencies in the Highway 21 fall and Bauer Road populations differed by less than 1% suggesting that the two samples were taken from a single large population. A comparison of Highway 21 fall and Eureka indicated a significant difference in frequency of the Xab and 5b arrangements at the two stations. — The summer '53 sample from Highway 21 showed significant shifts in the frequencies of the Xab, 4ab and 5b as compared to the previous fall. The frequency of Xab, having increased 14% from fall '52 to summer '53, declined to the previous level in the fall '53 sample from the same location. A fall '53 sample was taken from Eureka and a new station 147 miles upstream from Highway 21. There were no significant differences in the inversion frequencies at any of the three stations. — It appears that overwintering populations are subjected to genetic drift, whereas the relative stability of the larger fall populations is due to selection pressure.

BOWDEN, WRAY M., Department of Agriculture, Ottawa, Canada. Cytotaxonomic and genetic studies in Section Dortmanna of the genus Lo-

belia. — The North American species have been evolved from diploid ancestral populations. Five distinct lines of speciation can be traced. In each of three lines, only a single diploid (2n = 14) species has survived: L. inflata, L. kalmii and L. dortmanna. The fourth line consists of small-flowered species: L. nuttallii, L. feayana, L. canbyi, L. boykinii, L. appendiculata and L. spicata; the last diploid species is composed of four intergrading varieties. The fifth line has evolved the large-flowered species of this section; evolutionary centres were (1) the coastal plain and (2) the Appalachian Mountains. In both areas are found two old diploid species, L. puberula and L. georgiana. L. brevifolia is a primitive diploid coastal plain species and shows relationship to both L. puberula var. puberula and L. georgiana. L. reverchonii is a diploid coastal plain species derived from L. puberula and probably L. siphilitica var. ludoviciana. There are three amphidiploid (2n = 28) species: (1) L. elongata and (2) L. glandulosa were derived in the coastal plain from hybridization of L. puberula var. puberula, L. georgiana and perhaps L. flaccidifolia; and (3) in the Appalachian Mountains, L. amoena was derived from L. puberula var. simulans and L. georgiana. The mountain species, L. puberula var. simulans, is the probable ancestor of L. siphilitica and L. cardinalis has been derived from the latter. The evolutionary development of the large-flowered species has culminated in L. cardinalis subsp. cardinalis and subsp. graminea.

BOWEN, C. C.* and A. H. SPARROW, Brookhaven National Laboratory, Upton, New York. Radiosensitivity of several meiotic stages of Lilium** — The allometric relationship of mean bud length to stage of microsporogenesis in Lilium longiflorum var. Croft has been worked out in detail. This information has permitted the x-irradiation of anthers at known meiotic stages in intact buds. Cells were fixed at first and second meiotic anaphase and at first microspore division. Analysis of this material has shown a wide variation in the radiosensitivity of the several different stages. Late meiotic prophase showed extreme sensitivity compared to other stages as has previously been shown in Trillium. The high frequency of first anaphase bridges without fragments following irradiation at very late prophase and first metaphase will be discussed in the light of Crouse's work (Science 119: 485-487, 1954) on half-chromatid breaks, which these data appear to confirm. (*Public Health Service Research Fellow of the National Cancer Institute,) (**Research carried out at Brookhaven National Laboratory under the auspices of the U. S. Atomic Energy Commission.)

BLAUCH, BERTINA M., University of Pennsylvania, Philadelphia, Pa. Dzierzon's law and free oviposition in Melittobia. — According to Dzierzon's law eggs of the honey bee are all potentially male-producing if unfertilized, female-producing if fertilized. In the chalcidoid wasp Melittobia mated females lay many eggs almost all of which are fertilized and develop into females, but a few remaining unfertilized produce males. Unmated females normally lay very few eggs and these, if they develop, produce males. It has been suggested that their unlaid eggs are different from

their laid eggs in that they are potentially female-producing and incapable of development unless fertilized. In a selected stock of M. species-C many unmated females are free egg layers, lacking the normal block to oviposition. Although all of their offspring are males, it has not hitherto been shown that female-producing eggs, infertile unless fertilized, are lacking. Three free egg layers were isolated on host larvae, Sceliphron, and their eggs were counted every day or two until their death after eight days. From the 385 eggs counted (a very few may have been missed) there developed 378 males. It may therefore be concluded that all eggs are capable of development and are male-producing without fertilization.

BOYES, J. W., McGill University, Montreal, Canada. Karyotypes and their measurement in higher Diptera. — Chromosome complements from the brains of species in families such as the Anthomyidae, Calliphoridae, Sarcophagidae, and Tachinidae have been drawn, measured and photographed. Idiograms of these somatic complements constitute a basis for comparison of species, genera and families. Most species have 12 chromosomes but numbers range from eight to 19 or 20. There are extensive variations in chromosome morphology both within and between families. Sex chromosomes are more variable in morphology than the autosomes in most families and both X : Y and X_1X_2 : Y sex-chromosome mechanisms have been found. Several examples of individual flies deficient for one sex chromosome and of the presence of supernumerary chromosomes of various types have been seen. These studies indicate that higher Diptera have greater stability in both chromosome number and morphology than has been found in Drosophila species and emphasize that precise methods reveal variations between very similar complements which with ordinary examination would be erroneously considered as the same.

BRILES, W. E., Texas A. and M. College System, College Station. Evidence for overdominance of the B blood group alleles in the chicken. — Three White Leghorn inbred lines having a common origin have been examined for two seasons for possible effects of the $\underline{B}$ blood group alleles on hatchability, body weight at nine weeks of age, and egg production. Chicks from each of the lines were tested at four weeks of age with blood typing reagents prepared from iso-antisera made within the lines. Because of the several genotypes resulting from the three B alleles present in each line, all birds were classified as either heterozygous or homozygous. In collecting hatchability data matings were grouped according to the percent heterozygosity expected among the zygotes based on the blood types of the parents. The hatchability of fertile eggs produced by matings producing 0, 50, 75, and 100 percent heterozygosity were 46, 62, 71, and 78 percent, respectively. These data indicate that the probability of heterozygous embryos hatching is about 1.7 times that of homozygous embryos. — In two of the three inbred lines under study (lines 22 and 23) the body weight at nine weeks of age averaged 5 to 10 percent greater for the heterozygous than for the homozygous chicks. The third inbred population (line 24) showed no effect of the heterozygous condition at the $\underline{B}$ locus on growth in either

of the two years. This differential effect on growth suggests that the genetic background afforded by the different lines plays a significant role in determining whether or not the heterozygosity at the B locus will affect growth rate. — The average monthly egg production for the three inbred lines, where samples of twelve or more birds of each genotypic class were available for comparison, favors the heterozygous females. The average egg production of the heterozygous classes within each line and season was from nine to thirty percent greater than for the homozygotes. — Heterotic effects on such widely different characteristics as hatchability, growth rate, and egg production not only indicate that the phenomena of overdominance is operative but suggest that the condition of heterozygosity at the B locus is influencing rather strongly one or more fundamental physiological processes the effects of which are distributed throughout the life cycle of the organism. (This investigation was supported in part by a research grant (G-3332) from the National Institutes of Health, Public Health Service.)

BRAUN, WERNER, JEANNE WHALLON, and W. L. MAUZY, Camp Detrick, Frederick, Md. Further data on the selective effects of DNA upon bacterial population changes. — In studies with Brucella strains two different effects of DNA upon population changes have been observed: (1) transformation-like phenomena which occur when competent strains are exposed to highly polymerized heterologous DNA, and (2) a non-specific selective effect, which involves an inhibition of growth of the parent type cells while favoring continued growth and the rapid establishment of mutant type cells. The latter effect can be observed with certain strains following the addition of any bacterial DNA so far tested after it has been briefly exposed to DNase (Braun and Whallon, PNAS, 40: 162, 1954). The intensity of the selective effect depends greatly upon the production of a compound produced by mutant cells in the presence of enzyme-treated DNA. Some information on the general nature of this compound has been obtained in studies on the selective effects of variously treated filtrates obtained from mutant cultures containing DNA + DNase. In certain media these selective effects also occur to some extent when cultures are supplemented with only DNA or only DNase. This suggested that, depending on the medium employed, the cells themselves may produce both DNA and DNase. This was verified by chemical tests and it was shown that the medium-dependent selective effects are not correlated with differences in the amount of DNA accumulating in different media but appear correlated with medium-dependent differences in the ability of DNase to act upon DNA. The implications of these observations for a general consideration of the effects of nucleic acids upon the selective establishment of different types of cells will be briefly discussed.

BROWN, META S., Texas Agricultural Experiment Station, College Station, Texas. A comparison of pachytene and metaphase pairing in species hybrids of Gossypium. — Study of pachytene pairing in species hybrids of Gossypium has led to the following observations and conclusions: Chro-

mosomes of differentiated genomes pair intimately at pachytene, independently of the degree of metaphase association. Pachytene pairing in sterile as well as fertile hybrids appears as intimate as within species. Pachytene pairing in hybrids cannot be considered a measure of chromosome or species differentiation, and metaphase pairing remains the best criterion of chromosome homology as now defined. The extent to which non-homology is due to structural differences in Gossypium cannot be determined by pachytene studies. Not chromosome pairing, but chiasma formation appears to be the critical event for metaphase association in species hybrids. Paired pachytene chromosomes of different genome groups are equal in length despite differential size at metaphase. The maintenance of metaphase chromosome size characteristic of a species in chromosomes isolated from the parent species, and independent of pachytene length, suggests a mechanism controlling size which is autonomous within individual chromosomes. Reasons are given why neither structural differences nor genic action can account for all the pairing behavior of Gossypium chromosomes, and the question is raised whether a mechanism analogous to that controlling size may not control chiasma formation in Gossypium.

BURDICK, A. B., Purdue University, Lafayette, Indiana. Two types of heterosis in the tomato revealed by constant parent regression analysis. — Heterosis is manifest in the tomato in increased size of plant and in increased sexual earliness. In crosses of widely different types of tomato, the "average" hybrid plant is 28% heavier than its largest parent at 90 days of age. Such hybrids are usually intermediate with respect to their parents in time of flowering but will produce ripe fruit 1.62 days earlier than their earliest parent. — Constant parent regression analysis of plant size and earliness data give $b_2 = 0.0010$ for plant size and $b_2 = -0.0333$ for earliness (period from flowering to ripe fruit). Genetic interpretation would allow dominance as a cause of the negative b_2 for earliness but, by the same inference, would not allow dominance as the cause of the positive b_2 for plant size. Sufficient reason exists to attribute the positive b_2 to epistasis. — Earliness data may be further analysed to show distinctly different patterns of manifestation of heterosis in different hybrids. These patterns indicate that the genes of one parent may control development at one time while the genes of the other parent may do so at another stage. The term co-dominance is proposed to describe this phenomenon which may partially account for the general excellence of hybrids.

BUTLER, L., University of Toronto, Toronto, Ontario. The relation of squint, eyes open at birth, and wavy in the house mouse. — The eye abnormality squint is caused by wide alterations in the rates of development of the various parts of the eye. Squint mice often have their eyes open at birth and since the gene "o" has been postulated for this phenotype the independence or association of o & sq had to be established. Both "eyes open" and squint occur independently but breeding data indicate that such occurences are the result of differences in expressivity of a single gene instead of segregation of two genes. The close association of squint with

wavy distinguishes it from o but also suggests the hypothesis that squint is a pleiotropic effect of wa-2. The occurence of 3 Wa sq in an F_2 of 285 mice, and the limited breeding results from these, indicate that "squint" is a separate gene with incomplete penetrance. In the wa-2 sq line the penetrance has increased from 80% to 94%, while the wa-2 Sq line breeds true.

CLAYTON, FRANCES E., University of Texas, Austin, Texas. The development of the compound eyes of lozenge alleles in Drosophila melanogaster. – The development of the compound eyes of normal D. melanogaster and nine lozenge mutants was studied. Analysis of the larval and pupal differentiation indicates that the lozenge anomalies begin to develop at the end of the first day of pupal development. Those lozenge mutants which possess some normal facets in the adult eyes (lz, lz^{BS}, lz^{g} and lz^{34}) are similar in their development, differing only in the severity of the abnormalities which develop. These mutants are characterized by the presence of a layer of abnormal retinulae located in the postretinal region of the eye. The lozenge mutants which lack normal facets in the adult eyes (lz^{3}, lz^{y4}, lz^{s}, lz^{sB} and lz^{36}) develop similarly, being characterized by the failure of the retinulae to penetrate the outer layer of pigment cells and the failure of the primary pigment cells and pseudocone cells to differentiate normally. This results in the formation of a layer of pigment cells immediately below the cornea and in the distortion of the retinulae below the layer of cornagen cells. One of the basic mechanisms involved in the production of the lozenge type eye appears to be the failure of the ommatidial cells to differentiate normally during pupal development.

DERMEN, HAIG, U.S. Plant Industry, Beltsville, Maryland. Histogenetic factors in color and nectarine sports of peach. – a) A white colored somatic mutation, a rare instance of a change from a recessive to a dominant gene, has occurred in yellow fleshed Elberta variety. At fruit suture there is a yellow line bordered by white flesh. Some fruits are white except for a yellow suture. Most fruits have white flesh under the skin but yellow in varying patterns by the pit. b) Nectarine sport occurred somatically in J. H. Hale variety. On trees propagated from the sport branch most fruits are normal, hairy skinned; a few fruits are fuzzless like nectarine; many fruits are part fuzzy and part fuzzless. Nectarine character is ordinarily controlled by a recessive gene. The mutation described here behaves as if it were a dominant one. Variations in color, and fuzzy and fuzzless patterns in the two sports are shown to have a histogenetic basis. It is concluded that the color mutation has occurred in L-II in the shoot apex, and nectarine mutation in L-III. Diffusion of some material from tissue developed from L-III may be affecting hair development in the epidermis developed from L-I.

DERMEN, HAIG, U.S. Plant Industry, Beltsville, Maryland. Location of cells and mode of mitosis. – Cells at the shoot apex of angiosperms are arranged in layers. This is because cells in L-I almost invariably

divide anticlinally, in L-II anticlinally rather generally but with some periclinal division occurring, and in L-III and deeper in apex the mode of division is random. Epidermal tissue in peach fruit is one cell thick and is derived from L-I. In the development of ovary two edges of a U shape carpel meet. The suture in peach fruit and other fruits of the genus Prunus corresponds to the line where edges of the carpel have met. Therefore, in the suture area there are originally two layers of cells derived from L-I. In studying cytohistologically 4-2-2 or 2-4-4 types of cytochimeral peaches it was generally found that the tissue at the suture originating from L-I was more than two cell-layers thick. This is taken as evidence that mode of mitosis is influenced by the position of cells in parts of the plant as in the shoot apex and in the ovary. Certain forces, such as protoplasmic movement, may be affecting the orientation of mitotic spindle depending on the location of cells.

DOUDNEY, C. O., Biochemical Genetics Laboratory, Department of Zoology, University of Texas, Austin, Texas. Gene interaction and temperature response of the threonine inhibited strain of Neurospora. — Studies of the reversal of threonine inhibition of a strain of Neurospora crassa (UT77a) indicated that threonine inhibits growth by interfering competitively with the metabolism of homocysteine, thereby interrupting the biosynthesis of methionine, the thiazole moiety of thiamin, and, at higher concentrations, adenine and serine. In order to determine the effect of genetic interruption of threonine biosynthesis on the threonine inhibition process, double mutant strains possessing the gene mutation responsible for threonine inhibition and a gene mutation causing an absolute threonine requirement were constructed. One such strain (UT77, 44104) gave growth responses to threonine equivalent to the parent threonine requiring strain at concentrations of threonine effecting complete inhibition of growth of UT77. In this case the 44104 gene mutation suppresses the UT77 phenotype. However, another such strain (UT77, 35423) was even more markedly inhibited by threonine than UT77. Incubation temperature studies revealed that at lower temperatures UT77a requires either the thiazole moiety of thiamin or both homocysteine and threonine. The basis for the double amino acid requirement is a competitive antagonism between threonine and homocysteine, the presence of either in the medium producing a requirement for the other. The thiazole requirement is probably due to an interference of endogenously formed threonine with homocysteine metabolism. These facts suggest that the phenomena of growth inhibition by competitive mechanisms at the metabolic level may be one basis for temperature sensitive genetic blocks. Furthermore they suggest that a gene mutation which reduces biosynthesis of the inhibitory metabolite may suppress such a genetic block to biosynthesis. — These studies were aided by a contract between the Office of Naval Research, Department of the Navy, and the University of Texas, NR 859(00).

DUNCAN, ROBERT E., and JOHN W. WOODARD, and PHILIP S. WOODS,* University of Wisconsin, Madison, Wisconsin. Cytological effects

of sodium barbital. — Immersion in aqueous solutions of sodium 5-5 diethylbarbiturate (sodium barbital) 2500 p.p.m. completely inhibits root growth of Alium cepa and Vicia faba. At 1250 p.p.m. roots grow about half as rapidly as in distilled water. Dependent upon the extent of further dilutions sodium barbital may be less inhibitory, ineffective, or even stimulatory. Decreased growth at 1250 p.p.m. in Vicia, accompanies a decrease in the mitotic index. The proportion of nuclei at prophase to those at metaphase is greater in treated than untreated meristems. Among nuclei at prophase are many with shortened chromosomes and conspicuous polar caps, transition from prophase to metaphase apparently being delayed. The return to normal during recovery is rapid. According to photometric evaluation of the content of Feulgen stain (DNA equivalent) interphase nuclei in onion root meristems treated with 1250 p.p.m. belong to 2C, 4C, and intermediate classes in the same proportion as in untreated meristems. Some system other than synthesis of DNA must be affected and causes the decrease in mitotic index. Interference in this system apparently is responsible for the changes in prophase-metaphase ratio and the delay in transition from prophase to metaphase. (*Now at Dept. of Zoology, Columbia University, New York, N. Y.)

FABERGÉ, A. C., University of Missouri, Columbia, Missouri. The analysis of chromosome breaks by endosperm phenotype in maize.* — The procedure consists in irradiating pollen carrying the dominant endosperm markers I, Sh, Bz, Wx, in the short arm of chromosome 9, and using the corresponding recessive as the female parent. Enough data have now been accumulated to permit a general evaluation of the method which, in some respects, gives information not readily obtainable by other means. A complete balance sheet of the fate of chromosome breaks is complicated, but can, as a first approximation be summarized as follows: A broken end may (1) restitute; (2) rejoin with another free end to give an aberration; (3) remain free and give a chromatid breakage-fusion-bridge cycle. An estimate of the minimum proportion of breaks restituting is roughly 9/10 of all breaks, and may well be larger. Free ends produce a breakage-fusion-bridge cycle, and do not in general become stable; apparent stable terminal losses being usually interstitial deficiencies. The point of origin of a breakage-fusion-bridge cycle being a single break, from the frequency of such breaks arising in marked chromosome segments, a map may be constructed. This chromosome map is not very different from the standard linkage map; there is some deformation, the region distal to I, and the region between Wx and the centromere having an excess of breaks relative to their genetic lengths. (*Work supported by a research grant from the National Cancer Institute, National Institute of Health, Public Health Service.)

FORRO, F. (Introduced by R. S. Caldecott), Brookhaven National Laboratory, Upton, New York. P^{32} distribution among the progeny of labeled bacteria*. — It is possible that the stability of genetic mechanisms indicated by linkage group and mutation data may have as an underlying basis

the chemical stability of the molecular species involved. One component considered to have genetic function is desoxyribose nucleic acid. Chemical studies do not yet present a clear picture of the metaboïic stability of this molecule. By determining the distribution of a radioisotope among the progeny of labeled organisms, one might hope to trace the presence of stable genetic molecules which would follow a genetic segregation pattern. — Micrococcus cryophilus, chosen because it is characterized by a small number of "nuclear bodies" per cell and non-clumping growth habit, was grown in medium containing P^{32}, washed free of P^{32}, and regrown in non-labeled medium. Radioautographs were made on smears of the organisms at various times during the growth. The distribution of the P^{32} in the population was determined by microscopic grain counting of the autographs of individual organisms. Over the range of grain densities used, the average grain count per organism is a linear function of the decay-corrected exposure and of the P^{32} content per organism. Cytochemical techniques were used to define the phosphorus fractions under examination. The results indicate a randomization of the DNA phosphorus among the progeny to the extent that a model is required which is based on partition of the DNA into more than four segregative and chemically stable units per organism. (*Research carried out at Brookhaven National Laboratory under the auspices of the U. S. Atomic Energy Commission.)

FORSTHOEFEL, PAULINUS F., University of Detroit, Detroit, Mich. Further studies on the developmental genetics of luxoid, a skeletal variation in the house mouse. — A previous report described an average caudad shift of the hind limb field of one segmental lergth in $10\frac{1}{2}$ day lu/lu mice. A restudy of the material using a more refined criterion has shown no significant difference between the sample in which luxoid was segregating (mean: 25.486 segmental units) and the sample of normal embryos (mean: 25.459 segmental units). Since luxoid has as one of its effects an increase in the number of presacral vertebrae, there probably is a real caudad shift of the hind limb field. The failure to detect the shift with certainty can be explained by another effect of the luxoid gene postulated to explain the forelimb polydactyly of lu/lu mice, viz. a caudad shift of the competent tissue for the forelimbs. In the study of the possible caudad shift of the hind limb field, it was assumed that the intersegmental artery associated with the subclavian artery was a fixed anterior point in both lu/lu and normal embryos which could serve as a reference point in measuring the extent of a caudad shift of the hind limb field. Since the subclavian artery is intimately associated with the forelimb bud, it is probable that a caudad shift of the forelimb field in lu/lu embryos causes a caudad shift of the subclavian artery and associated intersegmental artery, and prevents detection of the caudad shift of the hind limb field by the method used. This hypothesis of a caudad shift of the subclavian artery will be tested.

FOX, ALLEN S., Michigan State College, East Lansing, Michigan. Paper chromatographic studies of the effects of the lozenge pseudoalleles and the Y-chromosome in Drosophila melanogaster. — Antigenic effects of

the lozenge pseudoalleles have been previously demonstrated (Chovnick and Fox, 1953, Proc. Nat. Acad. Sci. 39: 1035). The possibility of similar effects on protein precursors (amino acids and peptids) has now been investigated by means of paper chromatography. One-dimensional and two-dimensional chromatography of beheaded flies, squashed on Whatman No. 1 paper, with 80% aqueous phenol as first solvent and butanol-acetic acid-water (4 : 1 : 1) as second, affords satisfactory separation of ninhydrin-positive materials. The following amino acids have been tentatively identified in both sexes: aspartic, glutamic, serine, cystine, ornithine or taurine, glycine, lysine, threonine, glutamine, alanine, arginine, tyrosine, histidine or citrulline, valine, norvaline, methionine, tryptophane, and the leucines. Four additional ninhydrin-positive substances, probably peptids, are found in both sexes. Examination of all homozygous and heterozygous lozenge genotypes and coisogenic wild discloses no qualitative or quantitative differences. It is concluded that these genes produce their antigenic effects late in protein synthesis. — Males possess a ninhydrid-positive substance, probably peptid, not present in females. The sexes also differ with respect to a number of unidentified ultraviolet flourescent and absorbing substances, separated with propanol-ammonia (2 : 1) as first solvent and butanol-acetic acid water (4 : 1 : 5) as second. In a series of coisogenic stocks, males with and without a Y, or with an extra Y^S or Y^L, all exhibit the typical male patterns. Females with or without a Y, or with a Y^S or Y^L or both, all exhibit the typical female patterns. The heterchromatic Y-chromosome is therefore not responsible for the chromatographic differences between the sexes. — Supported by a grant from the National Institutes of Health.

FUERST, ROBERT., Genetics Laboratory, Department of Zoology, University of Texas, Austin, Texas. Differences in free intracellular amino acids in Neurospora. — The growth of Neurospora results in the accumulation of metabolic products in the medium, and in the production of free intracellular substances, such as amino acids, inside the cell. A correlation between the composition of the internal free intracellular nitrogen pool with protein synthesis was attempted. — By the use of chromatographic methods some 31 ninhydrin-sensitive substances were encountered in cell extracts containing free intracellular substances. — Qualitative and quantitative differences in amino acids were found to be associated with certain mutant characteristics. In some of the mutants certain amino acids were consistantly absent from the free amino acid pool. Other apparent differences between mutant and wild type disappeared in backcrosses to wild type, and new amino acids showed up. — The differences in the amino acid patterns are quite complex, but sufficient evidence is now available by the experiments to be described to assert that differences in free amino acids exist in certain Neurospora mutants. — These studies were aided by a contract between the Office of Naval Research, Department of the Navy, and the University of Texas, NR 859(00).

FUNG, SUI-TONG CHAN and JOHN W. GOWEN, Iowa State College, Ames, Iowa. Histological observations on the gonads of Drosophila melano-

gaster heterozygous for the hermaphroditic gene, Hr. — In early second-instar larval stage, the inter-mediate size of the hermaphroditic gonads is clearly differentiated from that of the normal males and females. The normal ovary contains small, compact cells with no definite arrangement. The testis is large and the gonial cells are uniform in size. The hermaphroditic gonad has two types of cells: small oogonial-like cells located at the two ends of the organ and larger cells, usually in a cluster of 8 or 16 found in the central portion of the gonad. These larger cells have a characteristic cytological appearance. Their nuclei are large, deeply-stained, and seem to contain chromosomes in polytene condition. They are recognizable to the late pupal stage. Their significance to sexual development is not clear. In the adult the hermaphroditic gonads are generally rudimentary but in some instances may attain mature size with irregularly arranged follicles. The hermaphroditic gonad lacks the thin, nucleated epithelium sheath that encloses the egg chambers in the normal ovariole. As a result, all egg follicles are in the form of loose egg-strings or enclosed in the peritoneal sheath. Yellow pigmented tissue characteristic of the testis sheath in normal males may associate with the hermaphroditic gonads. When isolated and studied histologically it shows that the cells resemble vasa efferentia. Three distinct cell layers are present. The external epithelium has large flat cells with bulging nuclei. The thin inner sheath has small cells. The thick innermost layer is formed of columnar cells. The presence of the external layer, with large nuclei and bulging cells, and the yellow pigmentation in the vasa efferentia even though the normal testis is absent, indicates that the hermaphroditic gonad, although potentially XX, can develop the pigments characteristic of the normal male.

GARBER, E. D., The University of Chicago, Chicago, Ill. The orientation of multivalents at metaphase I in the subgenera Para-Sorghum and Stiposorghum, genus Sorghum. — The subgenera Para-Sorghum and Stiposorghum, genus Sorghum (x = 5), include diploid and tetraploid species. Two of the 3 tetraploid species in Para-Sorghum have 1-5 ring quadrivalents at diakinesis and MI. In one species, S. leiocladum, open and zigzag rings occur with approximately equal frequencies at MI; in the other species, S. australiense, most of the rings are zigzag at the same stage. Sorghum plumosum (Stiposorghum) includes both tetraploid and hexaploid types. The tetraploid has 1-5 ring quadrivalents at diakinesis and MI; the hexaploid has mostly bivalents, quadrivalents, and hexivalents at the same stages. Most of the multivalents in this species are zigzag at MI. The directed orientation of multivalents at MI is considered to be genetically determined in S. australiense and S. plumosum but not in S. leiocladum. The implications of this interpretation will be discussed. (Supported in part by a grant from the Dr. Wallace C. and Clara A. Abbott Memorial Fund of The University of Chicago.)

GOWEN, JOHN W. and JANICE STADLER, Iowa State College, Ames, Iowa. Effect of acute and chronic X-ray and nuclear irradiations on life

spans of different strains of mice. — Four effects of irradiation from a high energy source concern those exposed; acute sickness and death following immediately on irradiation, prolonged but less acute effects resulting in impaired mental or physical health over the rest of the life span, changes in expected life span, and possible progeny effects as in sterility, abnormal mental or physical development, or unfavorable inheritance. Mice from 12 of our different inbred strains have been exposed to X- and gamma rays and neutrons from nuclear detonations. These animals are mated in pairs. Data are taken on the general health, behavior, fertility, mothering ability, and life span of exposed animals. Their progeny are observed to four weeks old for the same characteristics, and at necropsy for any internal lesions. Data on life expectancy, covering the four year period that the experiments have been in operation, may be interpreted as follows. Immediately following irradiation direct damage is expressed by increasing numbers of deaths as irradiation exposures become greater. The increases in deaths result in sharp reductions in expected life spans of exposed individuals. For single exposures the reductions in life expectancies are slightly curvilinear when plotted against dose. Where the irradiation doses are divided in two or five exposures with weekly intervals between, the reductions in life expectancies are linear with dose. Male and female mice show similar reductions in life span when exposed to like roentgen doses. Life expectancies for mice at exposure are reduced 0.31 days per roentgen where the irradiation is received in one dose, 0.29 days per roentgen where the dose is received during 2 exposures, and 0.15 days when exposures are 5 in number. Seventy-five to 100 days post irradiation covers the period of acute radiation effects. Following this critical period, life expectancy increases sharply. At 200 days the life expectancies of mice receiving the same total dose are reduced by 0.13 days for single exposure mice, 0.14 days for two treatments, and 0.11 days for 5 treatment mice. Life span differences are expressed at other periods and as affected by inheritance will be discussed.

HERSKOWITZ, I. H. and A. SCHALET, Indiana University, Bloomington, Ind. Sex-linked recessive lethal mutations connected with gross chromosomal rearrangements following nitrogen mustard treatment of mature Drosophila sperm.* — The number of recessive lethals associated with gross rearrangements has been found repeatedly by others to be fewer after chemical than after X-ray treatment. However, previous work with chemical mutagens may have included tests of gametes which at the time of treatment were not mature, and did not show the same relation between chromosomal breakage and/or union as obtains for mature sperm (which were more likely to be tested in the X-ray studies). It therefore seemed desirable to test this relationship by means of nitrogen mustard treatment of sperm known to be mature at the time of exposure. Accordingly, sex-linked recessive lethals in Oregon-R sperm, induced at the rate of 4.3% following sperm baths and 6.9% after vaginal douches with 1/4-2% methyl bis (beta-chloroethyl) amine hydrochloride, were tested for the simultaneous presence of gross rearrangements involving the lethal X. A gross

chromosomal rearrangement was detected by the reduction in crossing-over by 50% or more in either or both regions marked in heterozygous females carrying a lethal X and one including the recessive factors y v car. Lethal and rearrangement were considered associated wherever the rearrangement reduced crossing-over in one region of the chromosome in which the lethal was also present, or when crossing-over was reduced in both regions tested. Only 4 of 51 lethals of separate origin were associated with gross rearrangements, or about 8%, whereas at least 12% would be expected following X-radiation. — These data are in agreement with the earlier ones. Various explanations for this relationship will be discussed. (*This work has been supported by a grant received for work of H. J. Muller and associates from the American Cancer Society, on recommendation of the Committee on Growth of the National Research Council.)

HEXTER, W. M., Amherst College, Amherst, Mass. A population analysis of heterozygote frequencies in Drosophila melanogaster. — By means of a population bottle technique six autosomal recessive mutants (ey^2, cl, vg, th, h, b) in Drosophila melanogaster were tested for heterozygote superiority (overdominance). The populations were maintained for at least twenty-five generations. With one possible exception none of the mutants maintained a significant excess of heterozygous individuals for the entire length of the experiment. It is, therefore, concluded that no evidence for overdominance was demonstrated in these experiments. An excess of heterozygotes was present, however, in the early counts. This latter fact is attributed to the phenomenon of multilocus heterosis. It is reasonable to assume that some inbreeding degeneration has occurred in a stock that has been maintained for hundreds of generations. In the event of such inbreeding degeneration in two different stocks, considerable heterosis is to be expected in the hybrid individuals. All first generation homozygotes for the mutant gene or its normal allele would be inbred like their parents. The offspring of these first generation homozygotes, like all F1 offspring, might also be largely hybrids and hence more frequently heterozygous for the mutant than would otherwise be the case. Excess heterozygosis due to this cause might be expected to continue until the generation of flies is bred whose parents were only rarely derived from a single one of the two parent cultures. — In the thread experiment an excess of heterozygotes persisted for almost the entire experiment. Yet the frequency of the thread allele continually decreased and the degree of significance of the excess heterozygotes likewise decreased. It is postulated that this excess of heterozygotes is due to genes closely linked to thread and that recombination is breaking up this linkage as the experiment progressed.

HINTON, TAYLOR, University of California at Los Angeles. The genetic analysis of a nucleic acid requirement in Drosophila. — Standard crosses failed to reveal with certainty the location in the chromosome complement of the basis for the requirement since it behaved as a dominant effect in some crosses and as a recessive in others. Chromosomes

from a non-requiring strain were combined in all possible combinations with the chromosomes from the requiring strain. The results showed definitely that the basis for the requirement was on the same second chromosome with an inversion involving heterochromatin which produces a malformed eye. Certain genetic modifiers were found which affected both the eye phenotype and the requirement. Thus it appeared that both effects were position effects of the inversion. To test this point, a series of reversions and partial reversions of the eye phenotype was studied to determine the nucleic acid requirement. All 18 cases studied still had the requirement even though cytological studies showed that in every case, through subsequent rearrangement, the originally displaced heterochromatin had been moved to another position in the chromosome complement. In fact, the only factors held in common by these 18 strains and the original inversion was the requirement for nucleic acid and the displaced heterochromatin. It is, therefore, suggested that even though the original eye phenotype was caused by the proximity of heterochromatin to a particular region of the chromosome, the genetic basis of the nucleic acid requirement is a property of this heterochromatin itself and the effect remains regardless of the position of that heterochromatin so long as it remains altered.

HOROWITZ, N. H. and MARGUERITE FLING, California Institute of Technology, Pasadena, Calif. The autocatalytic production of tyrosinase in extracts of Drosophila melanogaster. — As a preliminary to an investigation of tyrosinase genetics in Drosophila we have begun a study of the enzyme in the wild type. Adult flies of the Canton-S stock are used. Fresh extracts are devoid of tyrosinase activity, but on standing at 0° they become active by a process which exhibits typical autocatalytic kinetics. This finding suggests a model of the trypsin-trypsinogen type, in which tyrosinase is formed by the tyrosinase-catalysed oxidation of one or more phenolic groups in a precursor. Tests of this hypothesis have shown it to be inadequate, since (a) activation occurs under conditions in which tyrosinase is inactive, and (b) the addition of tyrosinase (obtained by centrifugation of an activated extract) to a fresh extract does not show the expected effect on the rate of activation, whereas the supernatant, from which most of the tyrosinase has been removed, causes a marked increase. The results can be accounted for by the following model: Precursor + Activator = 2 Activator + Tyrosinase. According to this hyporhesis, tyrosinase is a by-product of an autocatalytic reaction in which it takes no part. — The reaction is very sensitive to pH, with the optimum at pH 6 when the extraction is made in water and at pH 6.8 when it is made in saline. This difference is due to the extraction by saline of a thermolabile factor which causes the pH-optimum of activation to shift toward higher values. — The Drosophila activation process appears to differ from that which has been described for grasshopper tyrosinase.

HOWE, H. BRANCH JR., University of Wisconsin, Madison, Wisc. Crossing-over in the first (sex) chromosome of Neurospora crassa. — Three regions: I, sex-ad-5 (71104), 4.6 units; II, ad-5-centromere, 2.5

units; III, centromere-vis (3717), 6.1 units are considered. Region IV, rib-1 (51602t)-centromere, 1.4 units, on chromosome 6, is used to detect nuclear transposition (e.g., slippage or spindle overlap). The cross is ad-5, vis, rib-1 A x wild type (73a-10a). — Of 940 asci dissected, enough spores germinated in 847 asci to allow complete tetrad analysis. The numbers of non cross-over and single cross-over asci observed agreed with calculated values. Of 19 double cross-overs found, 6, 9, and 4 involved 2, 3, and 4 strands, respectively. No triple cross-overs occurred. Although 5 of the 6 2-strand doubles involved regions II-III, directly across the centromere, four of these asci also showed apparent postreduction of rib-1 and therefore almost certainly resulted from nuclear transposition. No other double cross-over asci showed apparent postreduction of rib-1. The corrected doubles ratio, 2:9:4, differs significantly from Lindegren's (Genetics 27: 1-24) but not from the 1:2:1 chance expectation. The uncorrected doubles ratio does not differ significantly from Lindegren's, however, and this correction for nuclear transposition may account in part for his reported excess of 2-strand doubles across the centromere.

HSU, T. C., University of Texas, Medical Branch, Galveston, Texas. Abnormal mitosis in neoplastic cells and its implications on dynamic cytology. — Phase contrast, time lapse motion picture sequences of anomalous mitosis in HeLa (a tissue culture strain originally derived from a human cervical carcinoma) will be shown. There are many interesting features which cannot possibly be anticipated by examining fixed and stained preparations. For instance, a bipolar spindle may change into a tripolar arrangement during metaphase, telophasic chromosome groups may reunite into one nucleus, cytokinesis may delay for a long time after telophase, two widely separate cells may join together and form a single metaphase plate, etc. Rocking motion of nuclei before mitosis (pre-prophase) can be noted in a number of cases. These data indicate that tissue culture methods can be employed to reveal a number of hitherto unknown facts in cytology and that the dynamics of living cells needs further exploration.

HUESTIS, R. R. and RUTH S. WILLOUGHBY, University of Oregon, Eugene, Oregon. Neonatal jaundice in Peromyscus. — An inherited jaundice of the new born mouse has been discovered in our colony. Affected individuals are found to be yellow, or yellowish, a few hours after birth and the jaundice is followed by pallor and some debility. Some affected mice die or are destroyed by the mother, but recovery and later normal growth and fertility has been the rule. There is variability in the severity of the symptoms but penetrance is sufficient to make the identification of affected mice relatively easy. All of 8 mice jaundiced at birth, and examined at three months of age or later, proved to have splenomegaly. The spleen is characteristically black in color and roughly twice the size of the normal spleen in each diameter. Affected mice of breeding age have varying reticulocyte counts which average about 40 percent and do not overlap the counts made of normal mice of similar age. — The syndrome appears to be due to a single recessive gene substitution. Young mice not jaundiced after

birth but having one affected parent, do not have splenomegaly or a high reticulocyte count. Test crosses of similar mice in adequate number have given close to a 1:1 ratio of jaundiced and not jaundiced young.

HYDE, BEAL B., Botany Department, Indiana University, Bloomington, Indiana. Mitotic coiling of the differentiated chromosomes of P. ovata. — The structure of the telophase, interphase and prophase prochromosomes of this species has been studied in detail. Since the central segment of each of the eight diploid chromosomes never entirely loses its staining capacity, its coiling cycle can be followed through the interphase stage. The observations have been interpreted in terms of a conventional coiling scheme involving a single somatic spiral. The main difference between the coiling of the middle segments and the ends of the chromosomes appears to be a matter of timing. In the prochromosomes the old coil ravels more slowly while the new coil appears earlier than in the end segments. The new coil superposed on the old in various degrees of unwinding results in the great variety of shapes characteristic of prochromosomes. Partial uncoiling of chromosomes at several stages by ammonia vapor treatment indicates that chromomeres (in accordance with Rio and Crouse, P.N.A.S. 31: 1945) can be resolved into gyres of the coil. The constant structural differences along P. ovata chromosomes are believed due to constant differences in amplitude and frequency of the gyres of the coil.

JAMES, ALLEN P., Atomic Energy of Canada Ltd., Chalk River, Ont. Evidence of irradiation induced somatic crossing over in diploid yeast. — The gene pairs at three different loci, each concerned with galactose utilization (G_1g_1, G_2g_2 and G_3g_3) are being used to study a class of variants that occur with high frequency in diploid yeast following ultraviolet irradiation. The dominant phenotype is characterized by black (positive) colonies, the recessive by white (negative) colonies, on galactose-EMB indicator medium; and the absence of a dominant allele at any one of these loci results in the recessive phenotype. When positive cells that are heterozygous at one or more of these loci are irradiated and grown on indicator medium, variant colonies (either wholly negative or sectored) result. The variant frequencies are characteristic of the heterozygous loci, and at low doses of ultraviolet (200 ergs per mm^2) are 3.6, 1.7 and 1.0% in the genotypes G_3g_3, G_1g_1, and G_2g_2 (where the other loci are homozygous dominant). Three observations suggest that the variations are probably due to somatic crossing over: (1) in the sectored variant colonies from the Gg heterozygote there is a tendency for GG positive sectors to occur together with gg negative sectors, (2) variant colonies only rarely result on plating of irradiated positive haploid cells, and (3) the locus most frequently affected (G_3) is furthest removed from the centromere, as indicated by segregation studies of sex and galactose.

JANICK, JULES and E. C. STEVENSON, Purdue University, Lafayette, Ind. The effects of polyploidy on sex expression in spinach. — Crosses involving diploids and tetraploids were made to determine the effects of vari-

ous doses of X and Y genes on sex expression in spinach. Doubling of the chromosome number had no effect on the sex expression of staminate, pistillate, or monoecious plants. However from diploid x tetraploid and tetraploid x tetraploid crosses it was apparent that a single dose of Y causes the plant to be staminate even in combination with three doses of X. From the genetic ratios obtained, there is evidence that the disjunction of chromosomes containing the X and Y factors is completely at random in triploid and tetraploid plants. Triploid spinach was found to be highly fertile.

JANICK, JULES and E. C. STEVENSON, Purdue University, Lafayette, Ind. Genetics of the monoecious character in spinach. — The monoecious character in spinach appears to be controlled by a single "switch" gene. This gene, termed X^m, was found to be allelic to the gene or complex of genes, XY, conditioning the dioecious habit. X^m is incompletely dominant to X because plants of the genotype X^mX, although monoecious are more highly pistillate than plants of the genotype X^mX^m. The Y allele is completely dominant to X^m and X for plants of the genotype X^mY or XY are staminate. True-breeding monoecious lines (X^mX^m) may be inbred with high and low values of femaleness as measured by the proportion of pistillate to staminate flowers per plant indicating the presence of modifying factors.

KALTER, H., McGill University, Montreal, Quebec, Canada. Preliminary studies on the metabolic factors involved in the production of cleft palate in mice. — The administration of cortisone to pregnant mice of susceptible inbred strains at appropriate times during pregnancy induces a high frequency of cleft palate in the offspring. In continuing the investigation of this phenomenon, the writer has concentrated on clarifying the metabolic mechanisms involved by attempting to simulate cortisone's protein catabolic effect. — This was done by fasting pregnant females. Two days of fasting caused no abnormalities; 3 days a low incidence of cleft palate in the offspring of young animals and a much lower incidence in those of slightly older animals. To overcome the apparent refractoriness of the older animals to 3 days of fasting, a subteratogenic dose of cortisone was given on the first day of the fast. This, indeed, did have the desired effect—it increased the incidence and did so in older animals; but nor for long. As the females further aged, so even this treatment became less effective. — The hypothesis has been made that the protectiveness of age in this regard is due to increasing weight. Based on this, work now in progress is directed toward limiting weight increase during pregnancy, by restricting food intake prior to the fast, and toward preventing fat breakdown, thus enhancing protein breakdown, during the fast, by administering insulin at that time. If these treatments maintain or increase the frequency of starvation-induced cleft palate, the hypothesis is supported.

KENWORTHY, WALTER, Brown University, Providence, R. I. Effect of oxygen concentration on the survival rate of irradiated Habrobracon

eggs. — Survival ratios were determined for 3,998 Habrobracon eggs x-rayed during meiotic metaphase I in oxygen, air, or nitrogen. Survival of eggs irradiated in nitrogen ranged from 64.6% at 506 r to 10.6% at 2,200 r. Survival of eggs irradiated in air ranged from 36.3% at 506 r to no survivors at 2,200 r (1.9% survived at 1,518 r). Survival of eggs irradiated in oxygen ranged from 27.5% at 506 r to no survivors at doses of 1,518 r and above (2.6% survived at 1,100 r). — Survival ratios were determined for 1,622 Habrobracon eggs irradiated during meiotic prophase in oxygen or nitrogen. Survival of eggs irradiated in nitrogen ranged from 92.7% at 1,700 r to 20.0% at 24,000 r. Survival of eggs irradiated in oxygen ranged from 70.7% at 1,700 r to 1.6% at 24,000 r. — Dose-action survival curves for eggs irradiated in metaphase were exponential regardless of the gas in which irradiation took place. Dose-action curves for eggs irradiated in prophase were linear for the x-ray doses given. — Cytological studies of eggs irradiated with 1,000 r during meiotic metaphase I showed no chromosomal abnormalities other than terminal deletions. The percentage of such abnormalities was lower in eggs irradiated in nitrogen than in those irradiated in air or oxygen. Comparisons of chromosomal damage with survival data suggest that both dominant and recessive lethals decrease when irradiation takes place in the absence of oxygen.

KIMBALL, E., Clinton Experimental Farm, Clinton, Conn. Linkage in primary plumage patterns of the fowl. — Heritable units associated with primary plumage patterns determine gross phenotype, elaboration by melanocytes of specific eumelanin, and expression, modified expression, or nonexpression of secondary patterns. Experimental evidence indicates the heritable units are gene-clusters, comprising at least three chromosomal points, i.e., determinants of pigmentation, restriction, and down plumule length. Most probably, additional genes will be identified as components of the cluster. The situation is comparable to that encountered in pattern inheritance in insects, snails, fish, reptiles, and mammals (rodents); and a significant analogy exists with inheritance of blood groups (Sheppard, Amer. Nat. 87: 283-294, 1953). Species of Gallus, and subspecies of gallus, have a universal recessive (b-black) in common, linked with dominant pyle-zoned restriction and dominant long down. Wide diffusion of striped down phenotype and adult variants of R-restriction in the superfamily Phasianoidea, and striking analogies with larval, juvenile, and adult pattern successions in reptiles, e.g., Agama, suggest hoary antiquity for the Gallus type of gene-cluster. Polymorphic patterns in domestic fowl are demonstrably nonadaptive products arising incident to artificial selection. Although Gallus gallus mutates readily in respect to pattern under domestication, wild populations are peculiarly free of such novelties. If the gene-cluster of wild populations represents selection for increased linkage between genes affecting mutual selective values, and suppression of chiasma formation ensued by selection for inversions, it follows that nonadaptive mutants would be rapidly eliminated by natural selection. Conversely, selection pressure expressed as hominid whim would tend to preserve the same mutants in populations of domestic fowl, accounting for persistence of colum-

bian, extended black, birchen, quail, and other mutant primary patterns under artificial selection.

KIMBALL, R. F. and NENITA GAITHER, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Lack of an effect of a high dose of X rays on aging in Paramecium aurelia, variety 1. — It has been known for many years that Paramecium aurelia undergoes a progressive decline in division rate when it fails to undergo periodic nuclear reorganizations such as autogamy, A priori, this decline might be attributed to the accumulation and gradual segregation of deleterious mutations in the amitotically dividing macronucleus. A direct test of this hypothesis was made by exposing paramecia in the two-anlagen stage of postautogamous development to 80,000 r of X rays in order to induce a large number of mutations in the macronucleus. Thirty controls and thirty irradiated animals were used to start lines of descent which were continued as daily isolation lines with daily counts of the number of animals and staining of a sample from each line to check for autogamy. Each line was continued until it either died or underwent autogamy. After the first day, the division rate in the controls and irradiated groups became the same and remained the same for the duration of the experiment. After 44 days too few lines remained to furnish an adequate sample. The division rate declined linearly with time at the same rate in the two groups and reached about 70% of the starting rate in 44 days. Thus spontaneous macronuclear mutation is probably not the cause of the decline in division rate. Also a single large dose of X rays has no detectable effect on the aging process in vegetatively reproducing paramecia.

KING, R. C. and EUNICE M. Wood, Brookhaven National Laboratory, Upton, New York. Sex-linked lethal mutations induced by thermal neutrons in male and female Drosophila melanogaster.* — A study was made of the sex-linked recessive lethal mutation rate induced in the germinal tissue of Drosophila melanogaster males and females by thermal neutrons. The recessive lethal mutation rate/thermal neutron dose relation appears to be linear for sperm up to the highest dosage tested ($4.6 \times 10^{13} n_{th}/cm^2$). The relation is also linear for oöcytes and oögonia for doses up to 3.5×10^{13}-n_{th}/cm^2. The average mutation rate per unit dose for oöcytes is 75 per cent the male rate; for oögonia 38 per cent the male rate. The mutation rate in the most mature egg cells appears to be similar to the rate for sperm. To explain the lower frequency of mutations recovered from oögonia than from oöcytes it is assumed that either the mutation process occurs at a lower frequency in oogonia than in oocytes, or that a large fraction of the potential recessive lethal mutants are drawn off into inviable chromosome recombinations. On the basis of energy liberated per unit weight of gonadal tissue, thermal neutrons are found to be 2.5 times as effective as 90 kv X-rays in inducing sex-lined recessive lethal mutations in sperm and 1.8 times as effective in inducing mutation in oöcytes and oögonia. This greater efficiency is not related to the higher mean ionization density of the nitrogen capture protons which form the physical basis

of the action of this radiation. More likely the increased efficiency is due to a greater than average nitrogen content for the Drosophila gonad. (*Research carried out at Brookhaven National Laboratory under the auspices of the U. S. Atomic Energy Commission.)

LEDERBERG, ESTHER M., University of Wisconsin, Madison, Wis. The inheritance of lysogenicity in interstrain crosses of Escherichia coli. -- Of 50 diverse fertile strains, four proved to be sensitive to and lysogenized by the bacteriophage lambda carried by strain K-12. Crosses within these strains indicate an Lp locus determining lysogenicity and linked to Gal as in K-12. Each new strain lysogenized by lambda shows a more limited output of plaques when tested on K-12 than on the other sensitive indicators. Similarly, K-12 is more resistant than the other sensitives to free lambda originating from the other strains. By testing for sensitivity to both sources of lambda, and for lysogenicity on each indicator, four phenotypes are delineated: two lysogenic and two sensitive. These relationships are analogous to the host-induced modifications of lambda described by Bertani and Weigle (J. Bact. 65, 113). Whenever lysogenic x sensitive crosses involve K-12 as one parent, all four possible recombinant classes are found in the progeny, thus establishing a second locus, Mp, which modifies the expression of Lp. K-12 occurs as Mp^rLp^+ (lysogenic) or Mp^rLp^S (sensitive); the other four strains as Mp^SLp^+ (modified lysogenic) or Mp^SLp^S (modified sensitive). Linkage of Mp to the Lp-Gal loci was not demonstrated. Crosses reciprocal with respect to F (compatibility factor) differed in yield but not in the type of recombinants. The absence of sensitives from crosses of lysogenics segregating for Mp makes it likely that lambda prophage remains fixed to Lp, rather than Mp, in all lines.

LEDERBERG, J., University of Wisconsin, Madison, Wis. Phase variation in Salmonella. — The flagella carried by cells of a given serotype occur in two alternative phases (specific/group or 1 and 2) which are genetically conservative. The alternation may occur at a rate of 10^{-4} per generation (B. Stocker) or often much less, and superficially resembles point mutation. Genetic transduction analysis (Lederberg and Edwards, J. Immunol. 71, 232) has shown, however, that the alternative specificities are controlled by two distinct loci, H_1 and H_2, corresponding to the two homologous series of antigens, and accounting for the oscillation between just two states. The mechanism of genetic differentiation of the phases has not been settled: it might depend on the cytoplasm (as in Paramecium) or on the state of a third locus. However, the correlation found between the antigenic state of the donor cells and the transductive competence of phage lysates from them suggests a third alternative: that the differentiation is based on the states of the H_1 and H_2 loci themselves. — In addition, certain other antigenic variations, so-called "artificial phases" have been found to behave not as phasic oscillations but as point mutations of serological specspecificity, e.g. $H_1{}^b$ to $H_1{}^z33$.

LEFEVRE, G., JR., and P. C. FARNSWORTH, University of Utah, Salt Lake City, Utah. Mutational isoallelism at the yellow and white loci in

Drosophila. -- Timofeeff-Ressovsky (1932) reported the existence of 2 different wild-type alleles of white (w^{+A} and w^{+R}), distinguishable only by the fact that after irradiation w^{+A} mutated to w more than twice as frequently as did w^{+R}. We have verified this mutational isoallelism at the w^+ locus, and also have detected the same phenomenon at the yellow (y^+) locus. — Males containing y^+ or w^+ or both from 6 different stocks were exposed to 5000r doses of X-rays, and from 25,000 to 65,000 F_1 females in each series were examined for y and w mutations. Male-viable, male-lethal, and sterile mutants were recorded. The sterile mutants were apportioned among the other 2 classes, and then the expectancy of male-viable y and w mutants per 10^5 gametes tested was calculated. Such mutants fell into 2 distinct, non-overlapping mutability categories. Published mutation rates (including Timofeeff's) from similar experiments showed surprisingly good agreement. Adjusted to 5000r, male-viable y mutants occurred at the following 2 rates: 7.8 and 17.8 per 10^5; similar w mutants at 34.4 and 79 per 10^5. These values suggest the occurrence of a mutation "unit" of 8 or 9 per 10^5 ($1.6 - 1.8 \times 10^{-8}$ per gamete per r). Less extensive data at the vermilion and forked loci show only one mutation rate, similar to the low white rate. Perhaps in different stocks pseudoallelic duplication has occurred to different degrees; i.e., y^+ or y^+ y^+, w^+ w^+ w^+ w^+, etc.

LEVITAN, M., Virginia Polytechnic Institute, Blacksburg, Va. Additional evidence of position effects in natural populations. — Local populations of D. robusta contain the four possible combinations of two gene arrangements of the left arm of the X-chromosome, XL and XL-1, and two right-arm arrangements, XR and XR-2. The frequencies of the combinations are generally not equal to the frequencies expected on the assumption that left- and right-arm arrangements are independent. In the total data chromosomes XL XR and XL-1 XR-2 consistently and significantly exceed expectation, XL and XR-2 and XL-1 XR are deficient. However, the deviations from random association are not found in every season; nor are they uniformly significant in the two sexes or in both egg and adult samples of the same sex. It follows that selection is responsible for these results. The phenotypes with different adaptive value could stem from interaction of loci on the left- and right-arm arrangements, or they could stem from differences in the positional relationships of genes in the arrangements. The latter is the more likely hypothesis, as indicated by the greater number of adult females with linkage type XL XR/XL-1 XR-2 than with XL-1 XR/XL XR-2. If the position of the genes were not a factor, these types should be equal. Together with evidence of position effects of second chromosome inversions previously noted (in press), these data suggest that the role of position effects of inversions in natural populations has heretofore been underestimated.

LEWIS, H. W., University of California, Berkeley, California. Studies on a melanoma-producing lethal in Drosophila. — Experiments have been performed to study the action of a sex-linked, recessive gene in Drosophila melanogaster which in the hemizygous condition results in tumor formation

and death during the late larval period. Evidence from gene dosage experiments indicates that each dose of the lethal gene has an additive effect on tumor development. The viability of tumorous larvae is reduced by both genetic and environmental manipulations. Quantitative measurements of the effects of temperature and crowded conditions have been made and evidence of genetic modifiers has been found in four out of 23 wild type stocks tested. Heterozygotes for the lethal have a 3.7% increase in rate of development and are endowed with increased viability. The superiority of heterozygotes for the lethal over the wild type in a highly competitive environment has been measured in a population bottle experiment. Using paper chromatography, free amino acids of the body fluids of hemizygous, heterozygous, and duplication larvae were compared. Tumorous individuals show an absence of cystine and have higher levels of alanine, arginine, glycine, methionine, serine, and tyrosine than their controls.

LINDEGREN, C. C. and E. E. Shult, Southern Illinois University, Carbondale, Illinois. A general theory of crossing-over. — A theory of crossing-over has been formulated without making the demonstrably incorrect assumption that low frequency of recombination means low frequency of crossing-over. An algebra of tetrad analysis was based on three elements —the respective frequencies of (1) parental type, (2) recombinant type, and (3) tetratype tetrads. The possible effects of sister-strand exchange and chromatid interference upon the frequencies of different types of tetrads were analyzed by considering the effect of a single cross-over inserted to the right of a postulated cross-over pattern and calculating the limits of continued insertion of such cross-overs. It has been possible to show that sister-strand crossing-over either does not occur or occurs at a very low frequency and that chromatid and chromosomal interference generally have very low values. The relatively high frequency of recombinant tetrads indicates that crossing-over at the two-strand stage is not uncommon. The exceptionally high frequency of recombinant tetrads in some dihybrid analyses could only be explained on the assumption that crossing-over at the 2-strand stage occurred at every meiosis in one short region of the chromosome. The high frequency of recombinant tetrads in some dihybrid analyses indicates that the order of members of a linkage group is determined by minimizing the frequency of random recombination between the loci involved. If crossing-over occurs at the two-strand stage, previous theories of crossing-over are inadequate. A new theory of crossing-over is proposed on the hypothesis that crossing-over occurs at both the two- and four-strand stage.

MARKERT, C. L. and GLENN FISCHER, University of Michigan, Ann Arbor, Mich. Melanogenesis in cells of diverse genotype cultured in vitro. — The type of melanin (black, brown, or yellow) synthesized by a melanoblast is determined by its genotype and embryological history. The role of cell genotype in determining the substrate used for melanin synthesis was studied by culturing melanoblasts in vitro in the presence of C14 labeled tyrosine, tryptophane, dopa, and unidentified tyrosine oxidation products.

Melanoblast-containing tissue from New Hampshire Red and Barred Rock embryos and from inbred strains of black, brown, and yellow mice embryos were cultured in vitro until numerous melanocytes developed. The cultures were then prepared by conventional techniques for histological examination, coated with plastic, and radioautographed. Although the tissue cultures were saturated with labeled tyrosine (about 0.1 μC per hanging drop culture) during the period of melanogenesis no selective accumulation of tyrosine in melanocytes occurred in any of more than 100 cultures radioautographed. Similar concentrations of labeled dopa also failed to yield selective radioautographs in more than 30 preparations tested. Tryptophane completely inhibited melanogenesis. However, distinct radioautographs were obtained of melanocytes that developed in the presence of oxidation products of tyrosine. These oxidation products of tyrosine were obtained by incubating tyrosine, tyrosinase, and ascorbic acid until dopachrome was formed at which time the reaction was stopped by denaturing the enzyme. Thus, under the conditions of tissue culture, melanogenesis does not involve the selective uptake of exogenous tyrosine, tryptophane, or dopa, but does involve the selective concentration of some product of tyrosine oxidation. The role of cell genotype in substrate utilization will be discussed.

MARTIN, A., JR.[1], and R. M. WOTTON, University of Pittsburgh, Pittsburgh, Pa. The Golgi bodies as indicators of a common genotype. — Evidence is being accumulated to support the hypothesis that many genes (some 70-80 per cent of the genotype) are identical in structure and function in all living cells. Our observations on the Golgi substance indicate that it consists of a complex enzyme system containing a skeleton protein, and that this Golgi substance is active in the metabolism of fat. Observations on cells from oil-fed mamals, birds, reptiles, amphibians, and fish indicate that lipids are directly absorbed through cell boundaries, and that the conversion of such lipids into living protoplasm within the cell takes place through the instrumentality of the Golgi substance. The close physical association between the Golgi vesicles and the absorbed fat together with associated changes in the chemical composition of the absorbed fat while so associated, indicates that the Golgi substance is essential for the transmutation or conversion of foreign fat into species-specific fat. To be sure, the concept of species specific fat is not new, but as our cytological investigations demonstrate the Golgi vesicles are operative in building cytoplasm. While it is not easy to follow the course of water soluble amino acids and carbohydrates in metabolism, these substances, like fats, may also be processed by the Golgi substance before being ultimately incorporated into the living state. The morphology of the Golgi apparatus during fat metabolism is similar in the representative vertebrates studied. Such close similarity in all species examined would seem to indicate a common role and therefore a common genotype for the Golgi substance in fat metabolism throughout the Vertebrata. ([1]Veterans Administration Hospital, Leech Farm Road, Pittsburgh 6, Pa.)

MEYER, HELEN U., Indiana University, Bloomington, Ind. Crossing-over in the germ line of Drosophila melanogaster males following irradiation of the embryonic pole cells with ultraviolet.* — Crossingover in males of Drosophila is extremely rare; its frequency, influenced by certain physiological conditions, has been shown to be considerably increased by several mutagenic agents, particularly by certain ionizing radiation. — Several such cases had likewise been found in our earlier work applying ultraviolet to the embryonic pole cells, many of which enter the germ line. The distribution of recombinants indicated their origin long before meiosis, possibly caused by the treatment. — New experiments were performed using doses between 200 and 400 ergs/mm^2 of ultraviolet (2537 Å). Our most extensive data are for exchanges between the right arms of chromosomes 2, comparing some 34,800 offspring from 256 treated males and 98,600 from 624 controls. An 8.6-fold increase in the treated lot was found, with a frequency of .129% against .015% in controls. — Multiplicity of identical crossover offspring was similar to that of the lethals often induced in these same males, but crossovers were found more frequently in later broods. — 2 crossover events among controls yielded 11 and 4 crossovers out of 181 and 118 offspring, respectively, while 10 cases in the treated group had 45 crossovers in 1840 offspring. — When calculating the frequency of crossover events on the basis of number of treated primordia, one has to allow for some 2.9 times as many pole cells surviving in control embryos as in the treated lots, with these particular doses. Taking this into account, one arrives at a 30-fold increase after ultraviolet treatment. (*This work was supported by a grant received for work of H. J. Muller and associates from the American Cancer Society, on recommendation of the Committee on Growth of the National Research Council.)

MEYER, JAMES R.*, Delta Branch Experiment Station, Stoneville, Miss. Genes from cotton species. — Gossypium hirsutum, or upland cotton, is an allotetraploid species ($\underline{n}$ = 26) with sets of A chromosomes from linted Asiatic diploid cotton ($\underline{n}$ = 13) and sets of D chromosomes from lintless American cotton ($\underline{n}$ = 13). Pentaploid hybrids have been produced by crossing upland cotton with diploid A or D species, doubling the chromosome number of the triploid hybrid, and backcrossing the resulting hexaploid to upland. The use of pentaploid hybrids enables one to move or transfer definite genes from definite diploid species to upland cotton. A ''doubled haploid'' of upland, which is completely homozygous, has been used in the synthesis of these pentaploids and their derivatives. Fourteen different plant, leaf, and flower characteristics due to dominant or partially dominant genes are being transferred to this doubled haploid by backcrossing. The resulting isogenic strains can be used for interspecific genome analysis and other studies. (*Cytogeneticist, Delta Branch of the Mississippi Agricultural Experiment Station and Cotton Section, Field Crops Research Branch, Agricultural Research Service, U. S. Department of Agriculture, cooperating. — This abstract was prepared as part of a study which has been supported in part by funds appropriated under authorization of the Research and Marketing Act.)

MICKEY, GEORGE H., and ARMON F. YANDERS, Northwestern University, Evanston, Illinois. The production of dominant Minutes in Drosophila sperm irradiated with X rays, gamma rays and fast neutrons. — Mature sperm of Drosophila melanogaster (Oregon-R) were given doses ranging from 1500 to 9000 r of either Co-60 gamma rays of 250 kvp X-rays or from 250 rep to 2000 rep of fast neutrons. Treated males were mated to wild type virgins and transferred to fresh cultures each day through four cultures. The dominant Minutes were detected in the F_1 flies. Rates of Minutes induced by these high energy X rays did not differ statistically from those induced by gamma rays. The fast neutrons, however, were much more efficient per unit of dose in producing Minutes; their R. B. E. was about 4.5. Measured in terms of Minutes induced, the effects of these agents appear to be directly proportional to dose and also related to specific ionization density of the path. (Work supported by a research grant from the United States Atomic Energy Commission, Contract No. AT(11-1) -89, Project No. 7)

MILLER, D. D., University of Nebraska, Lincoln, Nebr. Intraspecific variation in spermatheca morphology in Drosophila affinis Sturtevant. — Spermatheca morphology was observed in strains of D. affinis from Florida, Illinois, Massachusetts, Nebraska, Tennessee, and Texas. External shape was found to vary from nearly spherical to relatively flat (strain mean averages of ratio of spermatheca width to height ranging from 1.22 to 1.61). There was also found to be variation in degree of penetration (telescoping) of the tube into the spermatheca (strain mean averages of ratio of spermatheca height to length of telescoped part of tube ranging from 1.34 to 2.84). In addition, the spermathecae sometimes had a pronounced terminal indentation, frequently only a slight indentation or none at all (strain frequencies of presence of terminal indentation ranging from 96% to 0%). — Reciprocal crosses were made between members of the Florida strain (characterized by relatively flat spermathecae, much penetration of the tube, and very pronounced terminal indentations) and members of the Texas strain (with nearly spherical spermathecae, little tube penetration, and no terminal indentation). The F_1 and F_2 generations had intermediate means of the spermatheca dimension ratios and the frequencies of terminal indentations, with the F_2's somewhat more variable than the F_1's. Backcrosses to the parent strains (all possible combinations) caused shifts in these values in the directions of the respective strains. No influence of direction of the original cross was apparent in these generations. The results are consistent with the interpretation that spermatheca morphology is governed by numerous nuclear genes, with little or no influence of extranuclear factors.

MILLER, WILMER J., University of Wisconsin, Madison, Wis. Segregation of species-specific antigens and the "hybrid substance" in backcross hybrids following a generic cross in Columbidae. — In contrast with the usual sterility of the hybrids from matings of the domestic pigeon, Columbia livia, with ring dove, Streptopelia risoria, eight offspring from a mating of an F_1 male to a ring dove have been obtained by a private breeder

who kindly made their bloods available to the author. Aggluntination tests were made with reagents detecting cellular species-specific antigens (A´, B´, C´, and E´) of livia in contrast to both C. guinea and S. risoria, and with reagents detecting the "hybrid substance" which is present in all F_1 hybrids, but not in the parental species. — A segregation of the "hybrid substance" and of each of the species-specific antigens of livia was observed among these eight backcross birds. The "hybrid substance" was demonstrable only in backcross birds which also possessed the C´ substance of livia, suggesting an association with C´. — The species-specific antigen C of guinea is antithetical to C´ of livia; heterozygotes (CC´) have a "hybrid substance." Of several serological specificities demonstrated for the "hybrid substance" of F_1-livia/risoria, one was associated with C of guinea, and another with heterozygotes (CC´). The assumption is that the "hybrid substance" of F_1-livia/risoria birds results from some kind of interaction of the genes or gene-products responsible for C´ of livia and a C-like antigen of risoria.

MORGAN, WALTER C., University of Tennessee, Knoxville, Tenn. — Eventration and exencephaly in mouse embryos. — Mice heterozygous for for the dominant tail mutation Crooked (a semi-lethal) were mated to mice heterozygous for the dominant tail mutation Tail-short (a lethal). Relatively small litter-size of the F_1 suggested a prenatal lethality. Dissection of females during late gestation provided a high incidence of monsters. -- The abnormal mice were smaller than their normal sibs and many were tailless. Conspicuous cranial overgrowths (exencephaly) and eversion of viscera (eventration) were observed in a higher proportion of the embryos than had ever been reported from dissections involving either of these mutations alone. All of the embryos with exencephaly and/or eventration either had very short tails or were tailless. This phenotype is representative of the Ts/+ genotype and not of Cd/+. Although exencephaly has been reported in Cd/Cd individuals, it has not been observed in the heterozygotes. — The high incidence of grossly abnormal embryos suggests an interaction of Cd and Ts which abruptly disorganizes normal embryonic development.

MORSE, M. L. (Introduced by M. R. Irwin.), University of Wisconsin, Madison, Wis. Transduction of certain loci in Escherichia coli K-12. — Lysogenicity for the phage lambda is determined by a nuclear gene closely linked to a cluster of loci affecting galactose fermentation (Lederberg and Lederberg, Genetics 38, 51). A small fraction of the cells in galactose-negative cultures can be transformed to fermenters by lambda lysates from positive, or from non-homologous negative, cells. The interactions between cells and lysates are concordant with allelism tests by crossing. With excess assay cells the number of transformations is proportional to the amount of lysate added, with an efficiency of about one transduction per million plaque forming particles. Most transformed clones are unstable for galactose fermentation and continue to segregate galactose negative cells after many single colony isolations. When Gal_1^- cells are trans-

formed with wild type lysates the negative segregants from the "heterozygous" positives are Gal_1^-. When Gal_1^- cells are transformed with a lysate of Gal_2^- cells, the negative segregants are usually Gal_1^-, occasionally Gal_2^-, and rarely $Gal_1^-Gal_2^-$. Similar results have been observed with various combinations of Gal_1, Gal_2, and Gal_4. Exceptional lysates transduce with an efficiency greater than 10^{-1}. These lysates are capable of (1) transforming a large fraction of a cell population, (2) transducing Gal^- as well as Gal^+ alleles, and (3) showing that adsorption of lambda to a cell is necessary, but not sufficient for transformation. The phage here, as in Salmonella (Zinder and Lederberg, J. Bact. 64, 679), acts as a passive vector of genetic material. Other loci tested, not linked to Gal, are not transduced by lambda.

MULLER, H. J., Indiana University, Bloomington, Ind. Characteristics of the far stronger but "spottier" mutagenicity of fast neutrons as compared with X-rays in Drosophila spermatozoa. -- Experiments of 1953, done with cooperation of Herskowitz, Abrahamson, Oster and others, taken in conjunction with earlier work with the Valencias and others (see these Records, 1951), establish frequency of translocations connecting second and third chromosomes at approximately $68 \cdot 10^{-6}$/rep, practically independently of dose, for neutrons from either Oak Ridge cyclotron or pile, applied to mature spermatozoa in young males. This effectiveness is 2.4 times that of 4000r X-rays, varying with X-ray (dose)$^{-1/2}$. -- NXE (neutron: X-ray effectiveness) in inducing male exceptions, lacking either paternal sex-chromosome or its marked portion, was 3-5. However, subtraction of partial losses, estimated by tests, indicated that NXE for complete losses, presumably representing isochromatid bridges derived from individual breaks, was about 7. Note agreement between these results and those on dominant lethals (Russell et al, 1953; Baker and von Halle, 1954), all obtained independently. Causes of lower NXE for eucentric rearrangements than for individual breaks are: (1) neutron rearrangements contain more complications; (2) they are therefore oftener aneucentric; (3) neutron-induced fragments probably have slower joining because multiple neighboring breaks ("shattering") must impede unions between major pieces, resulting in isochromatids. -- NXE for producing separately registered sex-linked recessive lethals was 2.4. However, for all visible changes of expression of specific loci NXE was about 4, as it was for proved "point-mutations" of these loci (this holds also for female germ cells). This difference from lethals is caused by multiple neighboring effects with neutrons, which hide some third of point-mutational lethals, yet cause neutron-induced rearrangements to affect more loci (hence, to give more "visibles") than X-ray-induced rearrangements. (Work supported by grants from American Cancer Society, on recommendation of Committee on Growth of National Research Council, and from U. S. Atomic Energy Commission (Contr. AT(11-1)-195).)

PALM, JOY and M. R. IRWIN, University of Wisconsin, Madison, Wis. A "hybrid substance" associated with a species-specific antigen in back-

cross hybrids. — A cellular antigen, d-4, peculiar to Pearlneck (Streptopelia chinensis) in contrast to Ring dove (S. risoria) has been obtained as a genetic unit in backcrosses to Ring dove of hybrids and selected backcross hybrids from matings of Pearlneck and Ring dove. Similarly, a d-4 like antigen, s-4, of Senegal (S. senegalensis) has been isolated following matings of Senegal and Ring dove. — Antisera produced against erythrocytes of backcross birds possessing only the d-4 antigen become reagents specifically reactive against d-4 after absorption with cells of Ring dove. These reagents agglutinate the cells of Pearlneck, Senegal and their backcross hybrids possessing d-4 or s-4. After absorption with pooled cells of Ring dove and Pearlneck, certain anti-d-4 sera reacted with cells of all backcross hybrids possessing d-4, indicating the presence of an antigenic specificity (''hybrid substance'') on these hybrid cells not expressed in either parental species. This reagent also agglutinated the cells of Senegal and of its backcross hybrids containing s-4. — The new antigenic specificity in backcross birds possessing d-4 may result from (a) an interaction of the gene or genes producing the d-4 of Pearlneck (or of linked genes) and genes of Ring dove, or (b) some kind of antigenic interaction. The combination of the d-4 ''hybrid substance'' and a d-4-related antigen, s-4, on the cells of Senegal, and the segregation of these two specificities as a genetic unit in backcrosses of Senegal hybrids suggest that the ''hybrid substance'' associated with d-4 is under genetic control and is, therefore, probably the result of gene interaction in backcross birds with d-4.

PARKER, D. R., Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Role of the Y chromosome in induced detachment of attached-X chromosomes in Drosophila melanogaster. — Radiation-induced detachment of attached-X chromosomes is a ''two-hit'' process (Parker, 1953; Herskowitz and Muller, 1953). If no Y chromosome is present, the exchanges are mainly X-4 translocations. The presence of a Y chromosome (sc^8.Y) increases the detachment frequency to about 1.7 times the frequency obtained without a Y. About 80% of the separations involve an exchange with the Y as determined by linkage of y^+, and by male fertility tests. The remaining 20% are mainly X-4 translocations. — Substitution of $sc.Y^L$ (a two-armed Y chromosome lacking Y^S fertility factors) gives no significant change in detachment frequency from that obtained using sc^8.Y. However, with $sc^{VI}.Y^S$ the rate is nearly doubled. With the ring chromosome Y^{LC}, the detachment frequency does not differ significantly from that obtained with no Y present, but segregation and/or type of exchange may be different. — It is concluded that there is close association between X and 4 in oocytes and that preferential pairing is such that the Y tends to ''protect'' chromosome 4, and Y^L tends to ''protect'' Y^S from exchanges with the X chromosome.

PAULEY, S. S., Maria Moors Cabot Foundation for Botanical Research, Harvard University, Petersham, Mass. Variation in time of break of dormancy among altitudinal ecotypes of Populus trichocarpa. — Altitudinal ecotypes of P. trichocarpa grown under uniform temperature and day-

length conditions during the spring of 1953, clearly indicated that low elevation (long growing season) types were significantly more precocious than high elevation (short growing season) types. These results were highly instructive, since we had anticipated that high elevation ecotypes would demonstrate a precocity similar to that which characterizes the behavior of their high latitude cousins.

PAULEY, S. S., Maria Moors Cabot Foundation for Botanical Research, Harvard University, Petersham, Mass. Influence of light on break of dormancy in various tree species. — In connection with studies of the influence of light on the break of dormancy in Populus ecotypes, ramets of various clones representing other species in other forest tree genera were also grown under uniform temperature in continuous light, natural day, and continuous darkness for a period of ca. 3 months in the late winter and early spring of 1953. Results of these studies reported previously for Populus (Jour. Arn. Arb. 35: 167-188, 1954) indicated that light or its periodicity apparently has little, if any, influence on break of dormancy in Populus. — Except that ramets exposed to continuous darkness were inhibited in varying degree (0-16 days), representatives of the following species broke dormancy in all compartments: yellow, paper, black, and gray birch; pin and black cherry; striped, red, and sugar maple; white ash. — Of special interest is the fact that members of the Fagaceae represented in the study (red, white, and black oak; American chestnut; and American beech) failed to break dormancy in continuous darkness. No significant difference in time of dormancy break was noted between ramets of these clones, or those noted above, in the continuous light and natural day compartments.

PITTENGER, THAD H. and K. C. Atwood, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee. The relation of growth rate to nuclear ratio in Neurospora heterocaryons. — In heterocaryons involving biochemical mutants in Neurospora crassa it has been assumed that there is a continual selection for nuclear ratios which will give maximum rates of growth. It is possible to test this assumption by comparing growth rate with changes in nuclear ratios in the same heterocaryon with different nuclear ratios. Such heterocaryons can be produced experimentally by mixing conidial suspensions of two nuclear types in various proportions. Nuclear ratios as great as 30:1 have been produced by this method. Conidial mixtures of the desired proportions are placed in growth tubes and samples of the conidia removed at intervals. These conidia are plated on minimal and supplemented media to estimate the nuclear ratios. Strains tested in various heterocaryotic combinations included Pan, al-1(5531,4637), Nic, al-2(4540,15300), Lys(4545), Arg(29997) and Pan, Paba, al-1(5531, 1633, 4637). — The relation between the nuclear ratio and the growth rate was found to be variable depending on the heterocaryon involved and the initial nuclear ratio. In most cases the nuclear ratio remained constant at the initial values throughout the length of the growth tube and the growth rate was unchanged over a wide range of nuclear ratios. On the other hand, in some heterocaryons, regardless of the initial ratio, there was selection

for one of the nuclear types without apparent change in growth rate. In some cases the growth rates were equal but submaximal at several different nuclear ratios. In still another case the nuclear ratio of two strains mixed in several different ratios stayed at the initial value through 10 days of growth without any selection even though the growth rate at the most extreme ratio was less than half that of the same heterocaryon at other ratios. It is apparent that in many heterocaryons there is not a definite selection toward nuclear ratios which give maximum growth rates.

RAGLAND, J. B., Genetics Laboratory, Department of Zoology, University of Texas, Austin 12. A strain of Neurospora inhibited by histidine. — Strain T-66, obtained by ultraviolet irradiation, is strongly inhibited by L-histidine in the medium, although it approximates the 72 hour growth of wild type in minimal medium. Wild type shows a slight inhibition by histidine in the early stages of growth but is able to overcome this inhibition completely in 72 hours. Inhibition of T-66 is reversed by all amino acids tested except aspartic acid, lysine, proline, and hydroxyproline. No other biochemicals tested other than amino acids relieved the inhibition. In the absence of an inorganic nitrogen source T-66 is able to utilize all amino acids tested as nitrogen sources as well as wild type. If histidine is present with amino acids as the sole source of nitrogen only alpha-amino-butyric acid, phenylalanine, methionine, threonine, serine, leucine, isoleucine, and valine appreciably relieve the inhibition by histidine. Six day growth experiments with T-66 shows that this strain is able to overcome the histidine inhibition in an adaptive fashion and reach maximum weight in six days. Preliminary studies of glutamic-aspartic and glutamic-leucine transaminases in dialyzed extracts of both wild type and T-66 indicate that histidine interferes with transamination in Neurospora. These systems are now being further investigated and will be discussed. Although the exact nature of the mutation involved in T-66 is not known, it appears to have altered the metabolism of the organism in such a fashion that the presence of histidine upsets the nitrogen metabolism. (These studies were aided by a contract between the Office of Naval Research, Department of the Navy, and the University of Texas, NR 859(00).).

RATTY, FRANK J., University of California, Berkeley. Some x-ray induced effects on embryonic viability in white leghorn chickens. — One effect of 1000 r. units of X-rays on the sperm of three consecutive generations of white leghorn chickens was a marked decrease in the viability of the zygotes following fertilization. This was interpreted on the basis of a genetic rather than a physiological action of the irradiation. When the proportion of viable 18 day embryos was determined, it was found that there was a depression of the viability in each generation from 71.0% in the controls to 28.5% in the first generation following irradiation to 21.9% in the second and 19.8% in the third. The viable 18 day old zygotes were not the result of fertilization by unaffected sperm. This was shown by the fact that when irradiation was omitted in the following generation, there was a residual loss of viability among their progeny to 61.3% in the first

and 52.5% in the second generation. This continued depression of the viability in subsequent generations indicated that inherited detrimental factors already present were augmented by additional treatment. The differential loss of viability observed between the zygotes produced by irradiated sperm and zygotes that were the result of non-irradiated gametes of the preceeding irradiated generation is best explained by the presence of dominant lethals in the former. However, the analysis of dose level experiments indicated that embryonic survival may be associated with recessive lethal effects as well as gross chromosomal changes.

RAUT, CAROLINE, Detroit Institute of Cancer Research, and Wayne University College of Medicine, Detroit, Michigan. The effect of ultraviolet light of various wavelengths on the production of cytochrome-deficient yeast. — Normal and cytochrome-deficient haploid strains of yeast were irradiated at various wavelengths of ultraviolet light. Both strains were killed at comparable rates with maximum rate of kill at 2600 Å. The action spectrum corresponds to the absorption spectrum of nucleic acid. A large proportion of the survivors of the irradiated normal cells produce cytochrome-deficient "petite" colonies. This cytochrome deficiency is cytoplasmically rather than genically determined. The production of petite colonies also exhibits a maximum at 2600 Å. It is suggested that absorption of ultraviolet by nucleic acid is involved in the destruction or inactivation of the cytoplasmic particles necessary for the production of the complete cytochrome system and possibly that the particles themselves contain nucleic acid.

RAY, DAVID T., FRISSELL HUNTER, and G. J. STEPHENS, Howard University, Washington, D. C. Sex difference and oxygen consumption in the wasp Mormoniella. — Rates of oxygen consumption in M. vitripennis were measured by the direct method of Warburg in microliters per gram per hour at various stages of development. Rate was highest in the eggs, 565.71, lowest in diapause larvae, 48.56. For males (from unmated females) and (85%) females (from mated females) respectively, the young larvae showed 533.33 and 559.06. These figures decreased to 334.71 and 287.67 on the sixth day just before pupation. For males and females respectively, rates were 320.14 and 217.16 at pupation, 133.56 and 130.60 after 60 hours, 218.39 and 182.27 just before eclosion, showing the U-shaped curve characteristic of most insects. Adult males and females gave 211.92 and 204.96 just after eclosion, 354.76 and 310.09 on the fourth day and 120.70 and 163.62 on the sixth day after eclosion. Graphically represented the rates show a rapid drop for the first two days to 408.25 in both sexes, followed by a gradual leveling off in which the males consistantly show a greater oxygen consumption, with the exception of one point during late pupation. This is probably the point of greatest gonad differentiation. Although males are smaller than females and much more active, both are sexually mature at eclosion. The data indicate sex differences in metabolic rate.

ROBINSON, H. F., R. E. COMSTOCK and P. H. HARVEY, North Carolina State College, Raleigh, North Carolina. Heterosis in crosses between open-pollinated varieties of corn. — With certain postulated conditions the dominant favorable gene hypothesis would not allow for gains of more than 5 per cent for hybrids between inbred lines above the random breeding populations from which the lines were derived (Crow, Genetics 33: 477, 1948 and Heterosis, Chap. 18, 1952). The demonstration of appreciable increases in heterosis in yield (where yield is essentially equated to selective value by Fisher (Theory of Inbreeding, 1949) and Crow (op. cit.)) in crosses of open-pollinated corn varieties is evidence against the validity of all of the assumptions made by Crow, applying to these random breeding parent populations. The presence of some overdominant loci has been suggested as a possible explanation of part of the heterosis occurring in hybrids of inbred lines. The overdominance hypothesis is not compatible with large amounts of heterosis in variety crosses if the genes in the parent populations are at equilibrium between mutation and selection. — The results to be presented from tests involving six open-pollinated varieties of corn and the fifteen possible crosses between these varieties are of interest with regard to the nature of gene action determining yield inheritance. Variety crosses yielded an average of approximately 20 per cent above the mean yield of parent varieties in two years at three locations. Certain combinations exceeded the mid-parent by more than 30 per cent. The use of reciprocal recurrent selection, with two open-pollinated varieties as foundation material, is suggested as a practical breeding procedure for improving both yield and agronomic characters of a variety cross.

RUNNER, MEREDITH N., Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine. Inherited hypofunction of the female pituitary in the sterile-obese syndrome in the mouse. — Sterile, obese females, homozygous for the recessive gene ob, have conceived only after artificially induced ovulations and matings. The earliest detectable symptoms of the hypogonadel portion of the syndrome have been investigated by comparing genetically obese mice with their nonobese sibs as controls. Tests for genetic competence of the uterus showed that (a) castration did not significantly change uterine weights in obese animals and (b) administration of estrogen to castrate and intact obese animals gave uterine responses comparable to those obtained in controls. Differences between uterine weights of obese and their normal sibs was apparently due to differences in levels of circulating estrogen. Genetic competence of the ovary to produce estrogen and/or to respond to gonadotropin was tested by administration of pregnant mare serum. The ob ovary proved capable of responding unusually well to gonadotropin and elaborated sufficient estrogen to render uterine weights in obese animals comparable to those in controls. — Hypofunction of the pituitary gland has been demonstrated, therefore, by (a) uteri of intact obese animals remaining castrate in size and (b) uteri and ovaries of obese animals being capable of adequate responses to administered hormones. The hypogonadal portion of the syndrome had its onset concomitant with phenotypic obesity, between 25 and 35 days of age. Vaginas of the

obese mice opened at the appropriate age but ovulation never followed and the animals remained prepuberal indefinitely. The cause of obesity in the adult mouse has been attributed to a primary block in acetate oxidation (Guggenheim and Mayer, 1952) and it is intriguing to speculate how this "hereditary biochemical lesion" might correlate with failure of the pituitary to elaborate gonadotropin.

RUSSELL, LIANE BRAUCH and R. JENELLE SPEAR, Oak Ridge National Laboratory, Oak Ridge, Tennessee. X-ray-induced dominant lethals in mouse oocytes and their relation to irradiation-to-ovulation interval. — Female (101 x C3H) F_1 mice were mated at various intervals after exposure to 400 r of X rays. Embryos were examined at the following postcopulation ages: (1) within 24 hours, alive under phase contrast; (2) at days 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, in sections stained by modified Feulgen; (3) at 2 weeks, at which time corpora lutea were also counted. The number (per female) of living 2-week embryos is very low for matings made within 18 hours after irradiation, approximately normal for the next four days, then, after a sharp drop, decreases gradually to zero for matings made more than 32 days postirradiation. For the first 3 weeks postirradiation this decrease in living young is not due to decreased number of ovulations. From days 2 to approximately 16 postirradiation, ovulations are actually significantly increased (to about 150% normal at peak), and there is a proportionate increase in the number of ovulated eggs fertilized normally. Therefore, on days 2-16, irradiated females yield a higher absolute number of fertilized eggs and the normal and decreased littersizes represent death of embryos. The finding of nuclear fragments in blastomeres indicates that some if not all death is due to the induction in the oocyte of chromosomal changes with dominant lethal effects. The results cited indicate that the incidence of such effects is about three times as high when eggs are irradiated just prior to ovulation (presumably while in meiotic division I), as when they are irradiated during the earlier parts of that estrus.

SAND, SEAWARD A., HAROLD H. SMITH, and ARNOLD H. SPARROW, Cornell University, Ithaca, N. Y., and Brookhaven National Laboratory, Upton, N. Y. — Stimulation by chronic gamma irradiation of the spontaneous rates of heritable somatic instabilities in a clone of Nicotiana. — A Nicotiana clone, S5230-5, selected from cultures on interspecific hybrid origin is employed. Flowers of this clone show a high, spontaneous, somatic "mutation" rate (10^{-3}) for one heterozygous, genetic locus, and a much lower rate (10^{-5}) for another heterozygous locus. The phenotypic consequences of these instabilities are sectors of speckled and purple tissue respectively on the normally red petals. These sectors are counted per cm^2 petal area of estimated epidermal cell-number. — Clonal replicates were grown at Brookhaven throughout the summer (1953) at ten levels of chronic gamma irradiation (Co^{60}) varying from control to 300 r per day. Analysis of variance and graphical presentation are applied to data from samples of flowers scored during July and again during August. — The purple-sector frequency shows linear increase with dosage. However, the

regression of speckled-sector frequency is non-linear, and gives radiation-induced increments ten times those of the purple-sector frequency in the range below 12 r per day. Significant differences exist in speckled but not in purple sector frequency between clonal plants subjected to the same irradiation level. Mean frequencies obtained in August are about two-thirds those for July from the same plants. — In somatic tissue the speckled locus or a related physiological system is (1) hypersensitive to differences in gamma irradiation level at low dosage, and (2) also responsive to differences in other, potentially separable, external, environmental factors and/or to internal environment tentatively assumed to be correlated with metabolism and development.

SCHALET, A. and I. H. HERSKOWITZ, Indiana University, Bloomington, Ind. Chemical Mutagenesis of mature Drosophila sperm treated in sperm baths and postcopulatory vaginal douches.* — The present experiments were performed (1) as an independent test of the reproducability of the results of mutation studies in which mature sperm were treated by a nitrogen mustard administered in sperm baths and postcopulatory vaginal douches, (2) to test whether a change in solvent for the mustard would influence its mutability, and (3) to test other chemical substances for mutagenic action when applied by these methods. — The standard Basc technique with the Oregon-R stock was employed throughout for the detection of sex-linked recessive lethal mutations. Two series of experiments with 0.1% methyl bis (beta-chloroethyl) amine hydrochloride given by both methods were carried out by the junior author (Schalet), the earlier one giving 1.3% mutations (13 mutations in 973 tested X chromosomes) and the later one 2.5% (14 mutations in 555 tests). The latter value value approached the 3.6% rate obtained earlier by the senior author. No clear difference in mutation rate was noted in these experiments whether the solvent for the mustard was propylene glycol or a 0.62% saline solution. — Tests for mutations following treatments with sublethal concentrations of 20-methylcholanthrene (in sesame oil) or allyl isothiocyanate in propylene glycol were negative (1 lethal in a total of 542 tests). Results of tests of ethyl sulfate and other substances for mutagenic action will also be presented. (*This work has been supported by a grant received for work of H. J. Muller and and associates from the American Cancer Society, on recommendation of the Committee on Growth of the National Research Council.)

SHAPARD, PAULINE B. (introduced by M. M. Green), University of California, Davis, California. A physiological comparison of vermilion eye color mutants of Drosophila melanogaster. — The suppressed ($\underline{v}^s$) and unsuppressed ($\underline{v}^u$) vermilion mutants of D. melanogaster have been further studied and found to differ in several physiological characteristics. Both $\underline{v}^s$ and $\underline{v}^u$ fail to produce brown eye pigment under normal genetic and environmental conditions and both accumulate non-protein tryptophane at a level much higher than do $\underline{v}^+$ individuals. Exogenously supplying either kynurenine or formylkynurenine to either mutant allows the production of brown eye pigment. The semi-dominant non-allelic suppressor gene sup-

presses both the eye color phenotype and the accumulation of non-protein tryptophane in $\underline{v}^s$ mutants, but has no apparent effect on either trait in $\underline{v}^u$ mutants. The eye color effect of the $\underline{v}^s$ mutants may also be overcome by partial starvation of larvae; it is not clear whether non-protein tryptophane accumulation is affected by "starvation." "Starvation" has no effect on the $\underline{v}^u$ mutants. That is, $\underline{v}^s$ mutants block tryptophane metabolism and, therefore, the production of brown eye pigment in a manner that can be overcome by specific genetic and environmental conditions, while no conditions have so far been found that will overcome the effects of $\underline{v}^u$ mutants, except supplying exogenously the normal products of tryptophane metabolism. It may be that $\underline{v}^s$ has an inhibiting action which is relatively easily destroyed, while $\underline{v}^u$ may more directly affect the production of the tryptophane oxidizing enzyme. This can only be determined through studies of the tryptophane peroxidase-oxidase enzyme system.

SINGLETON, W. R. and A. L. CASPAR, Brookhaven National Laboratory, Upton, N. Y. Effect of time of gamma radiation on microspore mutation rate in maize. — Corn plants were irradiated at different stages in the microspore development with 1300 r from a Co^{60} gamma source. The plants were grown in pails and moved into the gamma field where they were irradiated for 1 day only. The first plants were exposed just before meiosis, and the radiation program continued until pollen was shed, with a different group being exposed each day. — Some rather striking results were obtained. Meiosis was the most sensitive period for pollen injury, with at least 95% of the grains being injured. The same amount of radiation delivered 3 days later, and at all later dates, produced only about 10% damaged grains. — However, the time of greatest sensitivity for mutation production was fully 10 days later, just a few days before pollen shedding, when the rate for endosperm characters exceeded 3% per gene. More than 4,000 mutations were observed. — The average seed set was extremely low for meiotic irradiations, less than 20 seeds per ear. This rose quickly to a maximum of 200 seeds per ear, dropped to about 100 just before the period of maximum mutation production, then rose to 250 per ear at the period of maximum mutation production. The mutations dropped sharply for irradiations during the last 2 days before pollen shedding. — These data indicate that most of the mutations are produced at an entirely different time from maximum chromosomal damage as measured by injury to pollen. — Importance of these findings to plant breeding will be discussed.

SLATIS, HERMAN M., McGill University, Montreal, Quebec. Brown locus position effects in Drosophila melanogaster. — Position effects have been produced by irradiating both wild type and brown. A brown deficiency has a slight dominant effect on eye color. The 22 other brown rearrangements involve heterochromatin and are variegated. Homozygotes for $\underline{R}(+)$ position effects vary in pigmentation from phenotypes close to wild type to less than the heterozygote $\underline{R}(+)/\underline{bw}$. The heterozygote between two position effects is always moderately light in color. It appears that each position

effect has a characteristic intrachromosomal diminution of pigment and an interchromosomal effect and flies with two position alleles combine these effects. – Since the amount of pigment produced by interacting position effects appears to be predictable on a chemical basis, the structural theory of position effect, which explains gene action through the synaptic relationship of the chromosomes involved, is unsatisfactory. A simple chemical theory is proposed which assumes that brown is strongly affected by heterochromatin, and that the effect of heterochromatin is stronger on the chromosome which contains it than on the homologue. – Reinvestigation of the brown-dominant mutant brings it in line with other observations at this locus since it is found to be due to an insertion of heterochromatin very close to the brown locus. The heterozygote $\underline{bw}^{D}/+$ (and $\underline{st}/\underline{st}$) is always heavily variegated. Although the brown-dominant chromosome contains an excess of chromatin over the normal arrangement, in the homozygous condition it greatly reduces local crossing over. This has implications concerning various theories of crossing over.

SMITH, HAROLD H. and THORAYA A. LOTFY, Cornell University, Ithaca, New York. Comparative effects of beta-propiolactone and ceepryn (cetyl pyridinium chloride) on chromosomes of Vicia and Allium. – Root meristems of Vicia faba were treated for 1/2 hour with .02% (.0032 M) beta-propiolactone (BP1), .04% BP1, .001% (.000029 M) ceepryn (Cp), .002% Cp, .02% BP1 + .02% BP1, .02% BP1 + .001% Cp, .001% Cp + .02% BP1, and .001% Cp + .001% Cp. Combination applications were made 24 hours apart and fixations were made daily for one week after the first treatment. – Of the single-dose BP1 treatments .04% was the more effective and the average effect of the two concentrations was to give 13.5% cells with aberrant divisions. Of these 67% had fragments only, 24.5% bridges only, and the remainder various other aberrations. This is compared with the single-dose Cp treatments that produced 6.3% cells with aberrations of which 27.1% had fragments only and 71.2% bridges only. – In addition, a striking contrast in size of fragments was observed. BP1 treatments gave 81% large fragments, 16.2% medium and 2.8% small. Cp treatments gave no large fragments, 22.7% medium, and 77.3% small. Double dosages with either compound increased the frequency of smaller fragments, indicating additional sites of breakage. Combined treatments with both compounds showed different effects depending upon the order of application. – Single dosages with .02% and .04% BP1 were also used on root meristems of Allium cepa. Differences observed compared with Vicia were that .02% was more effective and the frequency of small fragments was much greater (52%). – The results are interpreted in terms of the difference in action of a cationic surface active denaturant (Cp) and a highly reactive alkylating agent (BP1); and the difference in distribution of heterochromatin within the chromosomes of Vicia and Allium.

SOKAL, ROBERT R., University of Kansas, Lawrence, Kansas. Selection for the separation of genetic correlates. – A genetic correlation has been established by Sokal and Hunter (1954) between resistance of larvae to

DDT in the medium and site of pupation in D. melanogaster. Selection for DDT—resistance brought about peripheral pupation of larvae, while selection for peripherality in pupation site resulted in resistance to DDT. Similarly, selection for susceptibility to DDT resulted in a central pupation pattern, while selection for centrality brought on susceptibility. — These earlier findings have been confirmed and extended. — Two new strains, derived from related stock, were started to test the possibility of breaking the above genetic correlation. The CR strain was selected simultaneously for centrality in pupation site and resistance to DDT, while the PS strain was selected for peripheral pupation site and susceptibility to DDT. Selection was necessarily from sibs on a family merit basis. Some 200 flies, representing offspring from 10 to 25 selected parent pairs were used as progenitors of each subsequent generation. — After 11 generations of selection some resistance had developed in the CR strain as compared with the PS strain. On the other hand no consistent trend in pupation site was apparent. The two strains alternated irregularly in peripherality. Thus there appears to be a conflict between the force of the genetic correlation tending to make the CR strain peripheral and the PS strain central, and the force of selection in the opposite direction. — This experiment lessens the likelihood of linkage between the two characters and makes a pleiotropic or some other physiological relation more plausible. A gene model based on this and other evidence is discussed.

SOOST, ROBERT K., University of California, Citrus Experiment Station, Riverside, California. Gene dosage effect of the Wo gene in tomato. — Tetraploid tomatoes were developed carrying various doses of the dominant lethal gene Wo. Plants with one, two, or three Wo genes were normal in growth and fertility. Plants with four Wo genes were not recovered. The phenotypic woolliness of the plants increased with gene dosage. The increase in woolliness is caused by an increase in the number of branched trichomes and an increase in the number of branches per trichome. The ave. number of trichomes per unit area was not increased. — Trisomics with one Wo gene had almost the same level of woolliness possessed by the Wo diploid. Trisomics with two and three Wo genes were not obtained. — The introduction of the Wo gene into four vigorous varieties of tomato did not increase the viability of the diploid Wo homozygotes.

SPARROW, A. H., V. POND and SELMA KOJAN, Brookhaven National Laboratory, Upton, New York. Microsporogenesis in excised anthers of Trillium erectum grown on sterile culture media*. — In order to study microsporogenesis under controlled conditions, a number of different culture media have been tested for their ability to support normal cytological development in anthers of Trillium erectum. Under sterile conditions, sets of anthers were removed from the flower bud at various stages of meiosis beginning as early as pachytene, placed on sterile culture media and examined periodically. Most of the anthers were allowed to go through to microspore division, then smeared and examined to determine the relative number of divisions and the degree of cytological abnormality (if any).

Eight different media were tested using a minimum of ninety-four anthers per medium. Disappointing results were obtained with all but two of the media. These were media consisting of basic nutrients used by Taylor (Amer. Jour. Bot. 37: 137-143) modified by the addition of two different concentrations of coconut milk. On these media more than seventy per cent of the anthers cultured at meiotic prophase reached the binucleate stage of microspore divisions in apparently normal condition. The results obtained so far definitely indicate that meiosis will proceed fairly normally in excised Trillium anthers grown on sterile culture media and that the method should prove very useful in experimental cytology. (*Research carried out at Brookhaven National Laboratory under the auspices of the U. S. Atomic Energy Commission.)

SPOFFORD, JANICE B., University of Chicago, Chicago, Ill. The effect of expressivity on selection against eyelessness in Drosophila melanogaster. — The accumulation of modifiers that reduce the phenotypic distinctness from wild-type is frequent for certain mutant stocks, including eyeless (ey). That eye-size in itself is of selective importance in laboratory cultures is indicated by comparing offspring of crosses involving different degrees of expression of the same allele, ey^4. A nearly isogenic wild-type stock was derived from an outcross to a marker stock. Fourth chromosomes carrying ey^4 were introduced by use of the same marker stock, followed by inbreeding to insure that only one wild-type and one ey^4 fourth chromosome were present. The stocks were then perpetuated by mass transfers. Four grades of eyelessness were distinguished. When in competition with $+/ey^4$ at 25°C., larger-eyed ey^4 flies left more progeny than smaller-eyed ey^4 flies. In spite of the attempt to eliminate genetic heterogeneity in all save the fourth chromosomes, parent-offspring correlations indicate the segregation of modifiers. To avoid fixation of modifiers in the large and small grades of eyes, parents were selected from as many cultures with as diverse parental grades as possible. An increasing parent-offspring correlation in the course of the experiment suggested some accumulation of modifiers, whose numbers are estimated by a comparison of F_2 with F_1 variances for crosses between large- and small-eyed parents.

STEFFENSEN, DALE, Brookhaven National Laboratory, Upton, New York. Increased frequency of X-ray-induced chromosomal aberrations in Tradescantia produced by a mineral-nutrient treatment.* — Plants of Tradescantia paludosa (clone 5 of Sax) were grown in Hoagland's solution (full and 1/10 concentration) and in soil. The solutions were changed monthly for the first 6 months in culture and the pH became slightly basic just prior to each change. After this period the 1/10 concentrated solution was not changed for 3 months, during which time the solution became first basic and then strongly acidic (final pH of 4.3). Under these conditions a mineral imbalance was likely. At the close of this 3 month period inflorescences from all of these conditions were irradiated with soft X-rays (100 KVP) and were examined for chromosome aberrations

one and four days later. Chromatid exchanges were significantly higher in the buds from the depleted 1/10 concentrated Hoagland's solution than in those grown in either the regularly changed full concentration solution or in soil. The spontaneous aberration frequency of unirradiated plants grown in the depleted 1/10 concentration solution was no greater than that of the plants grown under either of the two other conditions. These results were verified in a second experiment. The depleted 1/10 concentration solution produced plants with more chromatid exchanges for each isochromatid and chromatid break observed than did the plants grown on the solution maintained at full concentration. These data can be interpreted to bear on the problem of chromosome restitution. (*Research carried out at Brookhaven National Laboratory under the auspices of the U. S. Atomic Energy Commission.)

STRAUSS, BERNARD S., Department of Zoology, Syracuse University, Syracuse 10, New York. Studies on the Metabolism of Acetate by Acetate-Requiring Mutants of Neurospora crassa. — The ac mutants of Neurospora crassa require acetate for growth and accumulate pyruvic acid. Non-growing cultures shaken in buffer with glucose accumulate large quantities of pyruvate, cultures shaken in buffer with acetate accumulate smaller quantities of pyruvate. Studies using C-14 methyl or carboxyl labeled acetate indicate that pyruvate is formed from acetate by "leakage" from a tricarboxylic acid cycle. Sodium fluoracetate inhibits acetate and glucose oxidation in Neurospora and fluoracetate inhibited cultures accumulate citrate. ac mutants require up to 50mg of acetate for maximal growth under standard conditions. One strain (ac-4) will substitute about 40mg of succinate for acetate under special conditions. "Succinate" mutants (described by Lewis and by Dubes) give maximal growth on 2.5mg of succinate or on 2.5mg of acetate after a lag period. It is suggested that Neurospora crassa ordinarily uses the tricarboxylic acid cycle for acetate oxidation but that a dicarboxylic acid cycle becomes operative, adaptively, in the "succinate" mutants. — The amount of pyruvate accumulated by non-growing ac sp cultures shaken with glucose and buffer is reduced by the addition of acetate. This is a true inhibition of pyruvate formation by acetate. The significance of this inhibition of precursor formation by a product of the reaction chain will be discussed. (Work supported by contract AT(30-1) 1138 between Syracuse University and the Atomic Energy Commission.)

TASCHDJIAN, EDGAR, St. Francis College, Brooklyn. Genetics, Information and Communication. — This paper discusses the applicability of the concepts underlying Information Theory and Communication Theory to genetical problems, such as Mendelian heredity, linkage phenomena, mutations, degenerative inbreeding, excluding ontogenetic gene action. — Quantitative measures for information and entropies are calculated for several typical cases and it is shown that by considering the genotype as a set of symbols and heredity as a communication between parents and offspring, genetics can be profitably and more intimately connected with other disciplines.

TAYLOR, J. HERBERT, Columbia University, N. Y. Nucleic acid metabolism at the intracellular level. – Autoradiographs were prepared from larval salivary glands of Drosophila during mid-third instar after they had eaten food containing phosphorus-32. Since most of the P^{32}, remaining after extraction of acid soluble phosphates, was removed by ribonuclease, it will be referred to as RNA-phosphorus. No synthesis of DNA was detected at this stage. Resolution allowed detection of differential labeling in cytoplasm, chromatin and nucleolus. Quantitative comparisons were made by counting silver grains. – During the first hour labeled RNA appears in the chromatin and nucleolus, but cytoplasmic RNA is not detectably labeled. In two hours the RNA P^{32} per unit volume of cytoplasm is about one-fifth that in the nucleus. Larvae were removed to non-labeled food after two hours. During the next three hours the P^{32} in both nuclear and cytoplasmic RNA increased rapidly, but the rise in activity of cytoplasmic RNA is faster. Within five hours from the beginning of the experiment nearly uniform labeling of all parts of the cell is obtained. To the extent that incorporation of P^{32} represents synthesis of RNA, these experiments indicate a rapid synthesis in chromatin. Since the nucleolar activity also rises rapidly it must be a site of synthesis or rapid accumulation of material synthesized in the chromatin. The relation between rates of labeling of nuclear and cytoplasmic RNA is consistent with the view that most if not all of the cytoplasmic RNA is contributed by the nucleus and hence may represent the mechanism of gene interaction with the cytoplasm.

TELFER, J. D. and S. ABRAHAMSON, Indiana University, Bloomington, Ind. The higher egg mortality associated with insemination on the first than the second day after irradiation of Drosophila males. – Egg mortality was compared following ejaculation of Drosophila melanogaster sperm 0-24 and 24-48 hrs. after X-irradiation. Virgin adult males (y In49 f B/sc^8 . Y; bw^D/bw^D) 48-72 hrs. old were exposed to 3600 r and placed with equal number of virgin females (Y^s . X InEN y . Y^1;st) for 24 hrs. The males were then given new virgin females for a second 24 hrs. Eggs were collected from the females of both groups every 12 hrs. for 4 days. In a total of 25,433 eggs scored, the survival rate (corrected for control mortality) for eggs of first day's insemination period was only $47.6 \pm 0.14\%$ but $71.4 \pm 15\%$ for those of second day. These results agree with those of Baker and Von Halle (1953). Further studies were undertaken to determine whether the lower survival rate for the first day's material was due to males' virginity (and possible sperm overripeness). Survival rate on using first post-treatment day's sperm of virgin males was $45.5 \pm 0.23\%$, while that of non-virgins was $49.7 \pm 0.24\%$. In both cases, second days' inseminations gave significantly higher survival. Additional identical control studies indicated that the observed differences are in zygotic mortality rather than in copulation frequency or effectiveness at different lengths of time after the disturbances associated with irradiation. It would follow that sperm ejaculated immediately following radiation are more susceptible to genetic radiation damage than those, apparently less mature at irradiation, which are

ejaculated a day later. This higher "dominant lethal" rate during the first 24 hrs. would be further augmented by "overripeness" if the males were not allowed to mate before irradiation. (Work has been supported by a grant to Dr. H. J. Muller and associates from the United States Atomic Energy Commission (Contract AT(11-1) -195).)

VERDEROSA, F. and H. J MULLER, Indiana University, Bloomington, Ind. Another case of dissimilar characters in Drosophila apparently representing changes of the same locus.* — Like vortex, oblique, and their alleles, which years after their discovery were unexpectedly found to be heteromorphic derivatives of what was shown to be probably one complex locus (Muller, 1921, Science 53: 97 et seq.), so too the sex-linked recessive small eye, sy, found by Bridges as a spontaneous mutant (Genetics of Drosophila, 1925) and by Muller (1928) as an X-ray-induced one, and the X-ray-induced recessive outstretched wings, od (Muller, 1930), arose separately and, having seemingly unrelated phenotypes, were not suspected of allelism, although Bridges (see Bridges and Brehme, 1944) had placed both at 59.2 on the linkage map. Abrahamson in 1953 discovered an X-ray-induced mutant, termed "odsy" by us, combining both these characteristics. Our crosses between these types showed each "compound" to exhibit that mutant characteristic, and only that, common to both parents. Thus, od/sy appears normal. Crossing over was studied in the presence of heterozygous inversions ("Curly" and "Payne") involving all major autosome arms, to promote crossing over. Females with "cis" ("coupling") arrangement, f car/odsy, gave no genuine crossovers among 17,498 offspring (apparent crossovers were tested), while those with "trans" ("repulsion") arrangement, f od car/sy, gave none in 9,714. Nevertheless the region f-odsy, ordinarily giving 2.5%, showed 4 and 5%, and odsy-car, ordinarily 3.3%, showed 10 and 13% crossing over in cis and trans crosses, respectively. Since it is very unlikely that both odsy and od or sy involve minute inversions, we conclude that these genes are alleles. We propose as their revised symbols os, os^{o}, and os^{s}. (*Work supported by U. S. Atomic Energy Commission grant (Contract AT(11-1)-195).)

VOLPE, E. Peter, Newcomb College of Tulane University, New Orleans, La. Mode of inheritance of the mottled pigment pattern in Rana kandiyohi. — Collections of meadow frogs from the southwest quarter of Minnesota and adjacent parts of South Dakota reveal occasional individuals which differ markedly in pigmentation from the common meadow frog, Rana pipiens. These chance individuals are characterized by black vermiculate mottling of the interspaces between the usual black spots of the common meadow frog. The correct taxonomic designation of this mottled meadow frog has been problematical. It has been variously listed as Rana kandiyohi, Rana pipiens kandiyohi, and Rana pipiens, phase kandiyohi. A series of breeding experiments have shed light on the problem. Six sets of cross-fertilization experiments involving the mottled meadow frog (provisionally regarded as Rana kandiyohi in the experiments) and the common meadow frog (Rana pipiens) were conducted. Each set consisted of the following

crosses: kandiyohi ♀ x kandiyohi ♂, kandiyohi ♀ x pipiens ♂, pipiens ♀ x kandiyohi ♂, and pipiens ♀ x pipiens ♂. Embryos derived from the crosses were reated beyond metamorphosis, and the results indicate that kandiyohi differs from pipiens by a single dominant gene. In the kandiyohi ♀ x kandiyohi ♂ crosses, the transformed tadpoles displayed a clear-cut phenotypic segregation into a statistically significant ratio of 3 kandiyohi to 1 pipiens. Hybrids between kandiyohi ♀ x pipiens ♂ (as well as the reciprocal cross) gave the expected 1 : 1 ratio. Only the typical pipiens pattern resulted from the pipiens ♀ x pipiens ♂ crosses. Rana kandiyohi should not have the taxonomic rank of a species or subspecies but should be reduced to synonomy with Rana pipiens and be referred to as the "kandiyohi dominant mutant".

WAGNER, R. P., Genetics Laboratory, Department of Zoology, University of Texas, Austin, Texas. An apparent metabolic block induced in a Neurospora mutant by threonine. -- It has been previously reported that a Neurospora mutant, T77, grows well on minimal medium, but is inhibited by threonine at 35°C. It has now been found that in the presence of threonine, (but not in its absence), the slight amount of mycelium which does accumulate in the first 72 hours of growth produces a large amount of alpha-keto-β-ethylbutyric acid, a compound known to be a metabolic derivative of threonine and a precursor of isoleucine. Wild type does not accumulate this keto acid when growing in the presence of threonine, except briefly in the early phases of growth, after which time the compound rapidly disappears from the medium. Neither alpha-keto-β-ethylbutyric acid nor isoleucine are inhibitory to the growth of T77. — The significance of these findings in relation to the analysis of the metabolic disfunction which causes T77 to be inhibited by threonine will be discussed. — These studies were aided by a contract between the Office of Naval Research , Department of the Navy, and the University of Texas, Nonr 859(00).

WALKER, B. E. and F. Clarke Fraser, McGill University, Montreal, Quebec, Canada. The embryological basis for a strain difference in susceptibility to a teratogenic action of cortisone. — A particular schedule of cortisone injections into pregnant mice produces cleft palates in 100% of the offspring of A/Jax strain ♀♀ and in 18% of the offspring of C57BL strain ♀♀ (Kalter, Genetics 39: 185). The present study has shown that the secondary palate normally closes at a later stage of embryonic development in strain A/Jax than in strain C57BL. Cortisone treatment causes some delay in C57BL embryos and great delay in A/Jax embryos in the sliding of the palatine shelves from a vertical to a horizontal position. The palatine shelf movement was shown, by observations on fixed material and in vivo, to depend on a force that is built up within the shelves. The time at which the palate closes appears to depend on the rate of increase in this force. A strain difference in the ability of the maternal-embryonic system to build up the force necessary to bring about palatine shelf movement is considered to be the primary basis for the strain difference in reaction to the teratogenic effect of cortisone. (Work supported by the Banting Research Foundation.)

WHITING, P. W., University of Pennsylvania, Philadelphia, Pa. An impaternate gynander of the wasp Neralsia. — From parasitized blow-fly maggots collected at Woods Hole, Mass., August 1949, there were bred 48 females, 10 males of N. armata (Say) (Cynipoidea, Figitinae) (Identified by Lewis H. Weld). A second generation maturing in October and a third in December totalled 356 females and 183 males from females exposed to males; 1131 males (arrhenotoky) and one gynander (impaternate) from unmated females. The gynander (about 5 mm. in body length) had female abdomen and right antenna (11 short flagellar segments), male left antenna (12 long flagellar segments). — Males were more variable (4 to 6 mm.) in body length than females (4.5 to 5.0 mm.). Selection of large and small specimens did not affect number of flagellar segments. In female antennae these were always 11 in number and short, the terminal enlarged; in male antennae these were 12 and elongate. — The parasitized maggots, collected as they left the meat, formed pupae with legs and wing-pads well-developed and pigmented, but eyes colorless and general body surface smooth and white without bristles. Pupae were not formed, however, by infected maggots of the larger species (Calliphora, Sarcophaga). These died when half-grown and the parasite larva pupated within the partially consumed host. In no case were more than one wasp found within a single puparium of the many that were opened.

WOLFF, S. and R. C. VON BORSTEL, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee. The effect of pre- and post-irradiation centrifugation on the chromosomes of Tradescantia and Vicia. — Inflorescences of Tradescantia were irradiated with 200-r X rays. If the inflorescences were centrifuged within 30 seconds after the cessation of irradiation, the number of two-hit chromosome aberrations was increased. This is explained as being due to the physical separation of broken chromosome ends which consequently reduced the amount of rejoining. Similar results could be attained with as much as a 10-minute interval between irradiation and centrifugation if the plants were kept at 7°C. In order to prevent rejoining in this period of time. — If on the other hand, the plants were centrifuged previous to irradiation, the numbers of two-hit aberrations were reduced by a factor of two. At present we attribute this to a centrifugal "packing down" of the chromosomes which is not cytologically detectable. This "packing" would restrict chromosome movement and hence decrease the probability of exchange formation. — Similar experiments have been performed on the seed of Vicia faba.

WOODWARD, Val W., Brookhaven National Laboratory, Upton, L. I., N. Y. Mutation Rates at One Glutamic Acid Locus in Neurospora crassa. — It is possible, by means of the previously reported filtration and selective plating technique, to recover biochemical mutants of Neurospora in quantities sufficiently large to facilitate determinations of spontaneous and induced mutation rates. Previous studies of gene mutability and mutation rates in Neurospora have utilized the back-mutation technique. Since the mechanism and rates of back-mutations may differ greatly from those of

"forward" mutations, it is important to be able to study the characteristics of both types. — The macroconidial strain, 74A-3b, was used as a stock culture. Most conidia of this strain contain 1-3 nuclei (as many as 8 have been counted in a few conidia); therefore, the mutation rates are observed for numbers of mutant conidia rather than mutant nuclei. However, knowing the nuclear distribution, mutation rates per nucleus can be calculated. — The number of mutants per 10^4 conidia recovered from untreated and irradiated populations were as follows: untreated, 0.8; 4,560r x-ray, 5; 12,540r x-ray, 11; 21,600r x-ray, 18. A total of 66 mutants were recovered. These data indicate a linear dose-mutation relationship. (The author is a National Institutes of Health Post-doctoral Fellow. Research carried out at Brookhaven National Laboratory under the auspices of the United States Atomic Energy Commission.)

YANDERS, A. F., Northwestern University, Evanston, Illinois. An influence of age at time of treatment on the induction of Minute effects in the sperm of Drosophila melanogaster. — Adult males of D. melanogaster (Oregon-R) were exposed to 4500 r of X rays at one, seven, or fourteen days after eclosion. Each male was immediately pair-mated, then transferred to a new female at twenty-four-hour intervals for one week. The occurrence of dominant Minute characteristics, believed to be due to small deletions, was observed in the progeny. The frequency was highest in the oldest group, intermediate in the middle group, and lowest in the youngest group. The mean percentage of Minutes on successive days after irradiation showed a characteristic pattern in each age group. Curves of these values exhibit a striking similarity in form to those plotted for induced dominant lethals (from the data of Lüning, Hereditas 38: 91-107, 1952), suggesting that similar mechanisms are responsible for both dominant lethals and Minutes. This lends further support to the hypothesis that sperm increase in susceptibility to irradiation with increase in the age of the irradiated male, probably because of increased chromosome breakability. (Supported by a research grant to Dr. G. H. Mickey from the United States Atomic Energy Commission, Contract No. AT(11-1)-89, Project No. 7.)

ZAMENHOF, S., G. LEIDY and E. HAHN, Columbia University, New York, N. Y. Unstability of transforming principle induced by mutagenic agents. — The transforming principle (DNA) of Hemophilus influenzae is stable to heating (76°, 1 hr), incubation (37°, 22 hrs) or storage (6°, $\frac{1}{2}$ year), as evidenced by unchanged transforming activity and viscosity. When the decrease of activity and viscosity on prolonged heating was studied in function of time, the curves obtained suggested that more than one reaction is involved (such as unstabilization followed by inactivation). When the transforming principle was heated at 76° for more than 1 hr, the surviving active molecules became increasingly unstable to heat, incubation or even storage. Similar unstabilization of active molecules was obtained by sublethal action of U.V., nitrogen mustard (HN2), desoxyribonuclease and pH change. — The unstabilization of heredity determinants (transforming

principle, DNA) by mutagenic agents in vitro may have a bearing on the frequently inferred unstabilization of genes prior to actual mutation and on the delayed effect of mutagenic agents. — When the transforming principle was heated for 1 hr at 92° and the surviving 1 per cent, now rendered very unstable, was used for transformation experiments, the transformed cells yielded transforming principle which was completely stable: thus, the change (unstabilization) in vitro was not retained on reproduction and therefore was not a "mutation in vitro." As this change probably involves random breaking of hydrogen bonds in DNA molecule, it appears that such random breaking per se is not a basis of mutations. (This work has been supported by the Public Health Service grants, H. E. Alexander and S. Zamenhof, principal investigators.)

SAEZ, F. A. and M. E. DRETS, Departamento de Citogenética, Instituto de Investigación de Ciencias Biológicas, Montevideo, Uruguay. Cytological Alterations Induced by "Gonyleptidin" during Cell Division. — The action of Gonyleptidine (1), a new volatile substance of animal origin with antibiotic properties, was studied. Concentrations of 1-1,000 gammas per c.c., during varying times of action and recuperation, were used. — Meristem cells of Allium cepa roots show alterations in the helicoidal cycle (different degrees of linear contraction), diplochromosomes, delayed division of the centromere, C-metaphases, polyploidy, blocking of mitosis and interchromosomal coalescence of varying degrees. — Conspicuous findings are: Chromosome fragmentation and pulverization, with diffusion of DNA to the cytoplasm and concomitant loss of nuclear stain intensity. — In Germ cells of Laplatacris dispar (Orthoptera) different degrees and forms of coalescence even mass agglutination, were found. An important fact is the behaviour of the sex chromosome, which never agglutinates with the autosomes. Occasionally, chromatin rarefaction, appearing as holes distributed along the chromosome length, was observed. — Metaphase I is quickly affected by Gonyleptidin, and the chromosomes are deformed showing as Feulgen positive spherical bodies lying on a cytoplasmic background slightly stained by this reagent. In extreme cases, chromosomes agglutinate in one single mass. — Polyploid giants cells, reaching sizes up to 10 times the normal are often found. Gonial metaphases, as well as meiotic prophase, metaphase and anaphase I, presented a high degree of polyploidy. — In the diplotene stage., multivalent associations, and also configurations denoting the existence of different kinds of structural alterations, (high number of chiasmata, bridges, fragmentations, translocations, etc.) were observed. — Apparently normal zones were found beside affected ones in both plant and animal material. — These findings demonstrate the Gonyleptidin has a general physiological action, interferring with cell metabolism, disturbing and inhibiting growth and cell division. — On account to the Dariophysiological effects with indubitable genetic meaning, it is concluded that Gonyleptidin is a substance endowed with mutagenic properties. — (1—This substance was discovered by Prof. C. Estable at the Instituto de Investigación de Ciencias Biológicas de Montevideo.)

PROGRAM OF THE TWENTY-THIRD ANNUAL MEETING

GAINESVILLE, FLORIDA

SEPTEMBER 6 to 8, 1954

Monday Morning, September 6

(Papers 10 Minutes each)

9:00 a.m.; Concurrent Session A; Science Hall 101

Cytology - Speciation

META S. BROWN, Texas A. and M. College, Presiding

1. BOWDEN, WRAY M., Department of Agriculture, Ottawa, Canada. Cytotaxonomic and Genetic Studies in Section Dortmanna of the genus Lobelia.

2. HYDE, BEAL B., Indiana University, Bloomington, Ind. Mitotic Coiling of the Differentiated Chromosomes of P. ovata.

3. SPARROW, A. H., V. POND and SELMA KOJAN, Brookhaven National Laboratory, Upton, N. Y. Microsporogenesis in Excised Anthers of Trillium erectum Grown on Sterile Culture Media.

4. GARBER, E. D., University of Chicago, Chicago, Ill. The Orientation of Multivalents at Metaphase I in the Subgenera Para-sorghum and Stiposorghum, Genus Sorghum.

5. FABERGE, A. C., University of Missouri, Columbia, Mo. The Analysis of Chromosome Breaks by Endosperm Phenotype in Maize.

6. BOWEN, C. C. and A. H. SPARROW, Brookhaven National Laboratory, Upton, N. Y. Radiosensitivity of Several Meiotic Stages of Lilium.

7. WOLFF, SHELDON and R. C. von BORSTEL, Oak Ridge National Laboratory, Oak Ridge, Tenn. The Effect of Pre- and Post-radiation Centrifugation on the Chromosomes of Tradescantia and Vicia.

8. SOKAL, R. R., University of Kansas, Lawrence, Kan. Selection for the Separation of Genetic Correlates.

9. LEVITAN, MAX, Virginia Polytechnic Institute, Blacksburg, Va. Additional Evidence of Position Effects in Natural Populations.

10. HESTER, WILLIAM M., Amherst College, Amherst, Mass. A population Analysis of Heterozygote Frequencies in Drosophila melanogaster.

11. BLIGHT, WILLIAM C. (introduced by H. L. Carson), Washington University, St. Louis, Mo. A Study of Population Structure in Drosophila americana near St. Louis, Mo.

12. VOLPE, E. PETER, Newcomb College of Tulane University, New Orleans, La. Mode of Inheritance of the Mottled Pigment Pattern in Rana kandiyohi.

Monday Morning, September 6

(Papers 10 Minutes each)

9:00 a.m.; Concurrent Session B; Science Hall 102

Biochemical - Microorganisms

J. WERNER BRAUN, Camp Detrick, Frederick, Md., Presiding

1. FOX, ALLEN S., Michigan State College, East Lansing, Mich. Paper Chromatographic Studies of the Effects of the Lozenge Pseudoallelles and the Y-chromosome in Drosophila melanogaster.

2. SHAPARD, PAULINE B. (introduced by M. M. Green), University of California, Davis, Calif. A Physiological Comparison of Vermilion Eye Color Mutants of Drosophila melanogaster.

3. FORRO, FREDERICK, JR. (introduced by R. S. Caldecott), Brookhaven National Laboratory, Upton, N. Y. p^{32} Distribution Among the Progeny of Labeled Bacteria.

4. ZAMENHOF, STEPHEN, GRACE LEIDY and EROS HAHN, Columbia University, New York, N. Y. Unstability of Transforming Principle Induced by Mutagenic Agents.

5. MORSE, M. L. (introduced by M. R. Irwin), University of Wisconsin, Madison, Wis. Transduction of Certain Loci in Escherichia coli K-12.

6. WOODWARD, VAL W., Brookhaven National Laboratory, Upton, N. Y. Mutation Rates at One Glutamic Acid Locus in Neurospora crassa.

7. STRAUSS, BERNARD S., Syracuse University, Syracuse, N. Y. Studies on the Metabolism of Acetate by Acetate-requiring Mutants of Neurospora crassa.

8. PITTENGER, THAD H. and K. C. ATWOOD, Oak Ridge National Laboratory, Oak Ridge, Tenn. The Relation of Growth Rate to Nuclear Ratio in Neurospora heterocaryons.

9. DOUDNEY, C. O., University of Texas, Austin, Tex., (Oak Ridge National Laboratory, Oak Ridge, Tenn.). Gene Interaction and Temperature Response of the Threonine Inhibited Strain of Neurospora.

10. WAGNER, R. P., University of Texas, Austin, Tex. An apparent Metabolic Block Induced in a Neurospora Mutant by Threonine.

11. RAGLAND, JAMES B., University of Texas, Austin, Tex. A Strain of Neurospora Inhibited by Histidine.

12. FUERST, ROBERT, University of Texas, Austin, Tex. Differences in Free Intracellular Amino Acids in Neurospora.

13. PALM, JOY and M. R. IRWIN, University of Wisconsin, Madison, Wis. A "Hybrid Substance" Associated With a Species-specific Antigen in Backcross Hybrids.

14. JAMES, ALLEN P., Atomic Energy of Canada, Ltd., Chalk River, Ont. Evidence of Irradiation Induced Somatic Crossing Over in Diploid Yeast.

15. RAUT, CAROLINE, Detroit Institute of Cancer Research and Wayne University College of Medicine, Detroit, Mich. The Effects of Ultraviolet Light of Various Wavelengths on the Production of Cytochrome-deficient Yeast.

Monday Afternoon, September 6

2:00 p.m.; Science Hall 101

SYMPOSIUM

PSEUDOALLELISM AND THE THEORY OF THE GENE

C. P. OLIVER, University of Texas, Presiding

1. Introductory Comments by Chairman.

2. GREEN, M. M., University of California, Davis, Calif. Pseudoallelism and the Gene Concept.

3. LEWIS, E. B., California Institute of Technology, Pasadena, Calif. Some Aspects of Pc sition Pseudoallelism.

4. LAUGHNAN, J. R., University of Illinois, Urbana, Ill. Structural and Functional Bases for the Action of the "A" Alleles in Maize.

5. STORMONT, CLYDE, University of California, Davis, Calif. Blood Groups and Genes With Particular Reference to the Similarities of the Rh System of Man and the B System of Cattle.

6. STEPHENS, S. G., North Carolina State College, Raleigh, N. C. Summary, Synthesis, and Critique.

Tuesday Morning, September 7

INVITATION PROGRAM

(Papers 20 Minutes each)

9:00 a.m.; Science Hall 101

FRED H. HULL, University of Florida, Presiding

1. ROBINSON, H. F., R. E. COMSTOCK and P. H. HARVEY, North Carolina State College, Raleigh, N. C. Heterosis in Crosses Between Open-pollinated Varieties in Corn.

2. SLATIS, HERMAN M., McGill University, Montreal, Canada. Brown Locus Position Effects in Drosophila melanogaster.

3. BROWN, META S., Texas Agricultural Experiment Station, College Station, Tex. A Comparison of Pachytene and Metaphase Pairing in Species Hybrids of Gossypium.

4. SINGLETON, W. R. and A. L. CASPAR, Brookhaven National Laboratory, Upton, N. Y. Effect of Time of Gamma Radiation on Microspore Mutation Rate in Maize.

5. BRAUN, WERNER, JEANNE WHALLON and W. L. MAUZY, Camp Detrick, Frederick, Md. Further Data on the Selective Effects of DNA Upon Bacterial Population Changes.

6. HSU, T. C., University of Texas Medical Branch, Galveston, Tex. Abnormal Mitosis in Neoplastic Cells and its Implications on Dynamic Cytology.

Tuesday Afternoon, September 7

12:00 Noon; Student Service Center

GENETICS SOCIETY LUNCHEON
AND
BUSINESS MEETING

Tuesday Afternoon, September 7

2:30 p.m.; Concurrent Session C; Science Hall 14

Demonstration Papers

1. ANNAN, MURVEL E., University of Nebraska, Linclon, Neb. Effects of X-rays on Drosophila robusta Females.

2. BAKER, WILLIAM K., Oak Ridge National Laboratory, Oak Ridge, Tenn. Chromosome Association and Segregation in Polysomic Drosophila males.

3. BLAIR, W. FRANK and DAVID PETTUS, University of Texas, Austin, Tex. Differentiation in the Mating Call Among Southwestern Anuran Amphibians.

4. MEYER, JAMES R., Delta Branch of Mississippi Agricultural Experiment Station, Stoneville, Miss. Genes from Cotton Species.

5. DERMEN, HAIG, U. S. Plant Industry, Beltsville, Md. Histogenetic Factors in Color and Nectarine Sports in Peach.

6. DERMEN, HAIG, U. S. Plant Industry, Beltsville, Md. Location of Cells and Mode of Mitosis.

7. ATWOOD, K. C., FRANK MUKAI and THAD PITTENGER, Oak Ridge National Laboratory, Oak Ridge, Tenn. Neurospora techniques for Large-scale Studies of Recessive Lethal Mutation.

8. BOYES, J. W., McGill University, Montreal, Canada. Karyotypes and Their Measurement in Higher Diptera.

9. CLAYTON, FRANCES E., University of Texas, Austin, Texas. The Development of the Compound Eyes of Lozenge Alleles in Drosophila melanogaster.

Tuesday Afternoon, September 7

(Papers 10 Minutes each)

2:30 p.m.; Concurrent Session D; Science Hall 101

Physiological - Developmental

G. B. MAINLAND, Alabama Polytechnic Institute, Presiding

1. MILLER, WILMER J., University of Wisconsin, Madison, Wis. Segregation of Species-specific Antigens and the "Hybrid Substance" in Backcross Hybrids Following a Generic Cross of Columbidae.

2. MORGAN, WALTER C., University of Tennessee, Knoxville, Tenn. Eventration and Exencephaly in Mouse Embryos.

3. FUNG, SUI-TONG CHAN and JOHN W. GOWEN, Iowa State College, Ames, Iowa. Histological Observations on the Gonads of Drosophila melanogaster heterozygous for the hermaphroditic gene, Hr.

4. KALTER, HAROLD, McGill University, Montreal, Canada. Preliminary studies on the Metabolic Factors Involved in the Production of Cleft Palate in Mice.

5. MARKERT, C. L. and GLENN FISCHER, University of Michigan, Ann Arbor, Mich. Melanogenesis in Cells of Diverse Genotype Cultured in Vitro.

6. MARTIN, ALBERT, JR., VA Hospital, Pittsburgh, Pa. The Golgi Bodies as Indicators of a Common Genotype.

7. WALKER, B. E. and F. Clarke Fraser, McGill University, Montreal, Canada. The Embryological Basis for a Strain Difference in Susceptibility to a Teratogenic Action of Cortisone.

8. RUNNER, M. N., Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Me. Inherited Hypofunction of the Female Pituitary in the Sterile-obese Syndrome in the Mouse.

9. RATTY, FRANK J., University of California, Berkeley, Calif. Some X-ray Induced Effects on Embryonic Viability in White Leghorn Chickens.

10. MEYER, HELEN U., Indiana University, Bloomington, Ind. Crossing Over in the Germ Line of Drosophila melanogaster Males Following Irradiation of the Embryonic Pole Cells with Ultraviolet.

Wednesday Morning, September 8

(Papers 10 Minutes each)

9:00 a.m.; Session E; Science Hall 101

Formal Genetics - Statistical

S. G. STEPHENS, North Carolina State College, Presiding

1. VERDEROSA, F. and H. J. Muller, Indiana University, Bloomington, Ind. Another Case of Dissimilar Characters in Drosophila Apparently Representing Changes of the Same Locus.

2. ABRAHAMSON, S., I. H. HERSKOWITZ and H. J. MULLER, Indiana University, Bloomington, Ind. Genetic Proof for Half-translocations Derived from Irradiated Oocytes of Drosophila melanogaster.

3. PARKER, D. R., Oak Ridge National Laboratory, Oak Ridge, Tenn. Role of the Y-chromosome in Induced Detachment of Attached-X-chromosomes in Drosophila melanogaster.

4. BELL, A. EARL, Purdue University, Lafayette, Ind. A Gene in Drosophila melanogaster that Produces All Male Progeny.

5. SPOFFORD, JANICE B., University of Chicago, Chicago, Ill. The Effect of Expressivity on Selection Against Eyelessness in Drosophila melanogaster.

6- HINTON, TAYLOR, University of California, Los Angeles, Calif. The Genetic Analysis of a Nucleic Acid Requirement in Drosophila.

7. SOOST, ROBERT K., University of California, Riverside, Calif. Gene Dosage Effect of the Wo gene in Tomato.

8. BURDICK, ALLAN B., Purdue University, Lafayette, Ind. Two Types of Heterosis in the Tomato Revealed by Constant Parent Regression Analysis.

9. JANICK, JULES and E. C. STEVENSON, Purdue University, Lafayette, Ind. Genetics of the Monoecious character in Spinach.

10. JANICK, JULES and E. C. STEVENSON, Purdue University, Lafayette, Ind. The Effects of Polyploidy on Sex Expression in Spinach.

11. BRILES, W. E., Texas A and M College, College Station, Tex. Evidence for Overdominance of the B Blood Group Alleles in the Chicken.

12. BUTLER, L., University of Toronto, Toronto, Ont., Canada. The Relation of Squint Eyes, Open at Birth, and Wavy in the House Mouse.

13. TASCHDJIAN, EDGAR, St. Francis College, Brooklyn, N. Y. Genetics, Information and Communication.

14. HOWE, H. BRANCH, JR., University of Wisconsin, Madison, Wis. Crossing-over in the First (Sex) Chromosome of Neurospora crassa.

15. LINDEGREN, CARL C. and ERNEST E. SHULT, Southern Illinois University, Carbondale, Ill. A General Theory of Crossing-over.

16. TAYLOR, J. HERBERT, Columbia University, New York, N. Y. Nucleic Acid Metabolism at the Intracellular Level.

Wednesday Afternoon, September 8

(Papers 10 Minutes each)

2:00 p.m.; Session F; Science Hall 101

Radiation

A. M. WINCHESTER, Stetson University, Presiding

1. YANDERS, A. F., Northwestern University, Evanston, Ill. An Influence of Age at Time of Treatment on the Induction of Minute Effects in the Sperm of Drosophila melanogaster.

2. MICKEY, GEORGE H. and ARMON F. YANDERS, Northwestern University, Evanston, Ill. The Production of Dominant Minutes in Drosophila Sperm Irradiated with X-rays, Gamma-rays and Fast Neutrons.

3. KING, R. C. and EUNICE M. WOOD, Brookhaven National Laboratory, Upton, N. Y. Sex-linked Lethal Mutations Induced by Thermal Neutrons in Male and Female Drosophila melanogaster.

4. ALEXANDER, MARY L., FRANCES E. CLAYTON and W. S. STONE, University of Texas, Austin, Tex. The Induction of Translocations by X-radiations at Different Stages of Germ Cell Development in Drosophila virilis.

5. TELFER, J. D. and S. ABRAHAMSON, Indiana University, Bloomington, Ind. The Higher Egg Mortality Associated with Insemination on the First Than on the Second Day After Irradiation of Drosophila males.

6. ABRAHAMSON, S. and J. D. TELFER, Indiana University, Bloomington, Ind. Sex Chromosome Loss and Translocation Frequencies in Drosophila melanogaster After X-raying Sperm in Males or in Females.

7. HERSKOWITZ, I. H. and A. SCHALET, Indiana University, Bloomington, Ind. Sex-linked Recessive Lethal Mutations Connected with Gross Chromosomal Rearrangements Following Nitrogen Mustard Treatment of Mature Drosophila sperm.

8. SCHALET, A. and I. H. HERSKOWITZ, Indiana University, Bloomington, Ind. Chemical Mutagenesis of Mature Drosophila Sperm Treated in Sperm Baths and Postcopulatory Vaginal Douches.

9. SMITH, HAROLD H. and THORAYA A. LOTFY, Cornell University, Ithaca, N. Y. Comparative Effects of Beta-propiolactone and Ceepryn (Cetyl Pyridinium Chloride) on Chromosomes of Vicia and Allium.

10. SAND, SEAWARD A., HAROLD H. SMITH and ARNOLD H. SPARROW, Cornell University, Ithaca, N. Y. Stimulation by Chronic Gamma Irradiation of the Spontaneous Rates of Heritable Somatic Instabilities in a Clone of Nicotina.

11. STEFFENSEN, DALE, Brookhaven National Laboratory, Upton, N. Y. Increased Frequency of X-ray-induced Chromosomal Aberrations in Tradescantia Produced by a Mineral-nutrient Treatment.

12. BEATTY, ALVIN V. and JEANNE W. BEATTY, Emory University, Emory University, Ga. The Influence of Oxygen on the Physiological Effects of X-radiation in the Microspores of Tradescantia paludosa.

13. KIMBALL, R. F. and NENITA GAITHER, Oak Ridge National Laboratory, Oak Ridge, Tenn. Lack of an Effect of a High Dose of X-rays on Aging in Paramecium aurelia, variety 1.

14. GOWEN, JOHN W. and JANICE STADLER, Iowa State College, Ames, Iowa. Effect of Acute and Chronic X-ray and Nuclear Irradiations on Life Spans of Different Strains of Mice.

15. RUSSELL, LIANE BRAUCH and R. JENELLE SPEAR, Oak Ridge National Laboratory, Oak Ridge, Tenn. X-ray-induced Dominant Lethals in Mouse Oocytes and Their Relation to Irradiation-to-ovulation Interval.

PAPERS TO BE READ BY TITLE

1. BLAUCH, BERTINA M., University of Pennsylvania, Philadelphia, Pa. Dzierson's Law and Free Oviposition in Melittobia.

2. DUNCAN, ROBERT E., JOHN W. WOODARD and PHILIP S. WOODS, University of Wisconsin, Madison, Wis. Cytological Effects of Sodium Barbital.

3. FORSTHOEFEL, PAULINUS F., University of Detroit, Detroit, Mich. Further Studies on the Developmental Genetics of Luxoid, a Skeletal Variation in the House Mouse.

4. HOROWITZ, N. H. and MARGUERITE FLING, California Institute of Technology, Pasadena, Calif. The Autocatalytic Production of Tyrosinase in Extracts of Drosophila melanogaster.

5. HUESTIS, R. R. and RUTH S. WILLOUGHBY, University of Oregon, Eugene, Oregon. Neonatal jaundice in Peromyscus.

6. KENWORTHY, WALTER, Brown University, Providence, Rhode Island. Effect of Oxygen Concentration on the Survival Rate of Irradiated Habrobracon Eggs.

7. KIMBALL, ELLIOT, Clinton Experimental Farm, Clinton, Conn. Linkage in Primary Plumage Patterns of the Fowl.

8. LEDERBERG, ESTHER M., University of Wisconsin, Madison, Wis. The Inheritance of Lysogenicity in Interstrain Crosses of Escherichia coli.

9. LEDERBERG, JOSHUA, University of Wisconsin, Madison, Wis. Phase Variation in Salmonella.

10. LEFEVRE, GEORGE, Jr. and P. C. FARNSWORTH, University of Utah, Salt Lake City, Utah. Mutational Isoallelism at the Yellow and White Loci in Drosophila.

11. LEWIS, HERMAN W., University of California, Berkeley, Calif. Studies on a Melanoma-producing Lethal in Drosophila.

12. MILLER, DWIGHT D., University of Nebraska, Lincoln, Neb. Intraspecific Variation in Spermatheca Morphology in Drosophila affinis Sturtevant.

13. MULLER, H. J., Indiana University, Bloomington, Ind. Characteristics of the Far Stronger but "Spottier" Mutagenicity of Fast Neutrons as Compared with X-rays in Drosophila Spermatozoa.

14. PAULEY, S. S., Harvard University, Petersham, Mass. Influence of Light on Break of Dormancy in Various Tree Species.

15. PAULEY, S. S., Harvard University, Petersham, Mass. Variation in Time of Break of Dormancy Among Altitudinal Ecotypes of Populus trichocarpa.

16. RAY, DAVID T., Howard University, Washington, D. C. Sex Difference and Oxygen Consumption in the Wasp Mormoniella.

17. WHITING, P. W., University of Pennsylvania, Philadelphia, Pa. An Impaternate Gynander of the Wasp Neralsia.

18. SAEZ, F. A. and M. E. DRETS., Instituto de Investigación de Ciencias Biológicas, Montevideo, Uruguay. Cytological Alterations Induced by "Gonyleptidin" During Cell Division.